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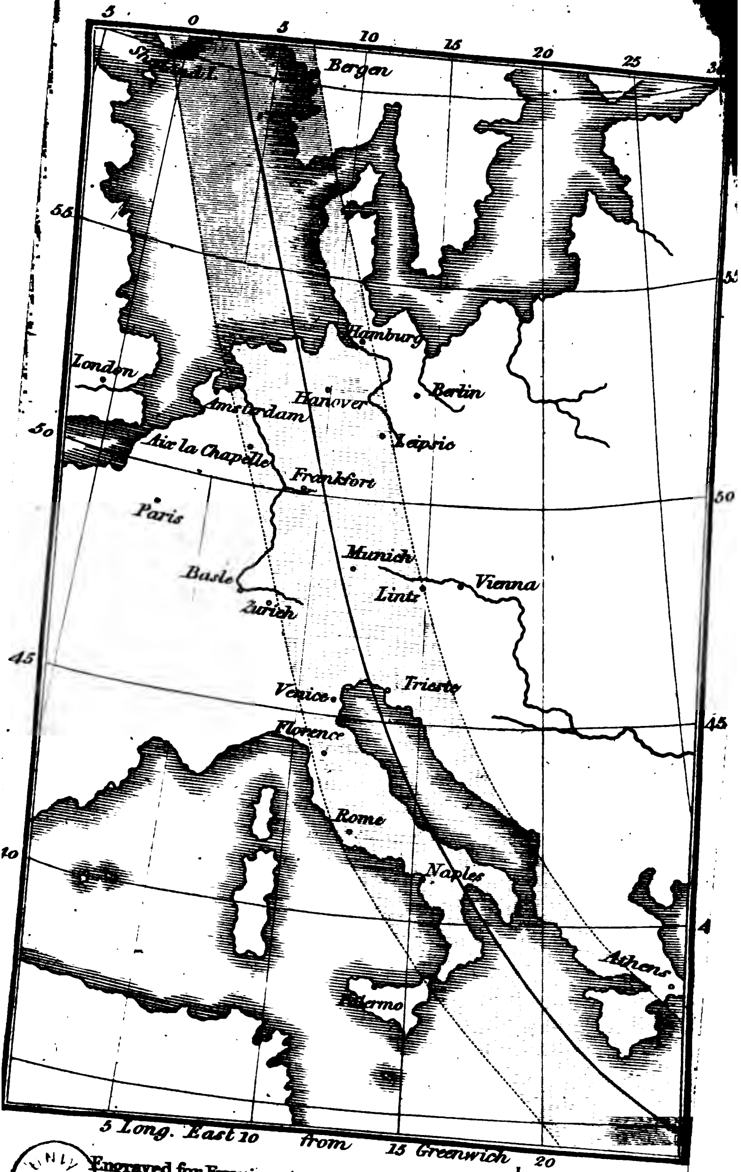

Engraved for Evening Amusements for the Year 1820.

EVENING AMUSEMENTS;

OR, THE

BEAUTY OF THE HEAVENS

DISPLAYED.

IN WHICH

SEVERAL STRIKING APPEARANCES,

TO BE OBSERVED ON VARIOUS EVENINGS IN THE

HEAVENS,

DURING THE YEAR

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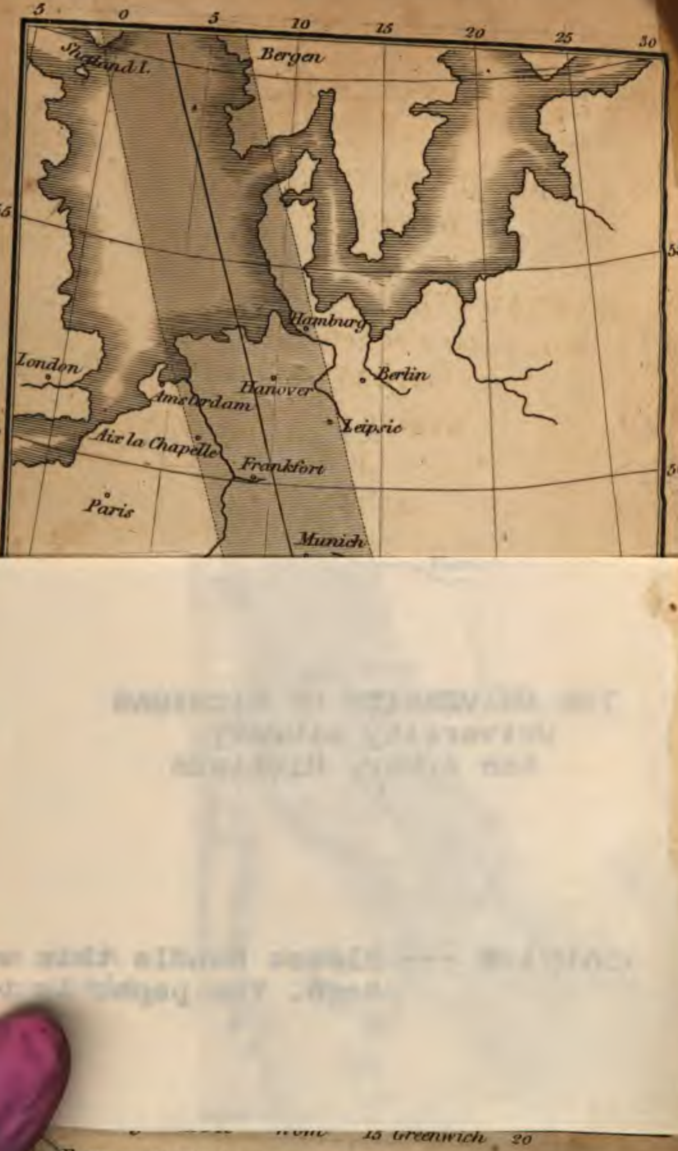

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TO BE CONTINUED ANNUALLY.

BY WILLIAM FREND, ESQ. M.A.

ACTUARY TO THE ROCK LIFE ASSURANCE COMPANY, AND LATE FELLOW
OF JESUS COLLEGE, CAMBRIDGE; AUTHOR OF PRINCIPLES
OF ALGEBRA, TANGIBLE ARITHMETIC, ESSAY
ON PATRIOTISM, ETC.

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ADVERTISEMENT.

In this Volume, on the suggestion of a Young Lady, I have frequently inserted the Characters for Stars, and the Signs of the Zodiack, as they appear upon the Globe, and as they are frequently used in conversation. The Greek Alphabet is so similar to our own, that there is little difficulty in distinguishing the Characters, and learning the names of them. But that they may be more easily referred to, the Alphabet is here subjoined; and an hour or two employed upon it, will make my readers easily acquainted with it.

The Greek Alphabet.

1.	α	Alpha.
2.	β	Beta.
3.	γ	Gamma.
4.	δ	Delta.
5.	ε	E-psilon.
6.	ζ	Zeta.
7.	η	Eta.
8.	θ	Theta.
9.	ι	Iota.
10.	ϰ	Kappa.
11.	λ	Lambda.
12.	μ	Mu.
13.	ν	Nu.
14.	ξ	Xi.
15.	ο	O-micron.
16.	ϖ	Pi.
17.	ρ	Rho.
18.	σ	Sigma.
19.	τ	Tau.
20.	υ	U-psilon.
21.	φ	Phi.
22.	χ	Chi.
23.	ψ	Psi.
24.	ω	O-mega.

The Signs of the Zodiac.

1.	♈	Aries, the Ram.
2.	♉	Taurus, the Bull.
3.	♊	Gemini, the Twins.
4.	♋	Cancer, the Crab.
5.	♌	Leo, the Lion.
6.	♍	Virgo, the Virgin.
7.	♎	Libra, the Balance.
8.	♏	Scorpio, the Scorpion.
9.	♐	Sagittarius, the Archer.
10.	♑	Capricornus, the Goat.
11.	♒	Aquarius, the Water-bearer.
12.	♓	Pisces, the Fishes.

EVENING AMUSEMENTS;

OR, THE

BEAUTY OF THE HEAVENS

DISPLAYED.

TO THE READER.

MY book is entitled "EVENING AMUSEMENTS," and that title sufficiently indicates for what purpose it is designed. Every evening almost affords something, which may excite the attention of those, who had been accustomed previously to view the heavens without any fixed design. They observed stars rise and set, might occasionally notice the superiority of brilliancy of some over others, but not having been in the habit of distinguishing one star from the other, or knowing indeed in what a planet differed from a fixed star, year succeeded year, presenting objects in a vast variety of situations, without making any permanent impression on their minds. The same confused appearance of brilliant orbs presented itself to them. They might remark at one time, that the heavens were particularly splendid, but they were not in the least aware of the cause. The beauty of the motions of the wandering bodies was lost upon them. They heard of the evening and the morning star; but knew not, that it was the same orb, that went at different times by this name; nor why at some times the setting Sun should be followed, at other times the rising Sun preceded, by a body under these names, and at others no such appearance should take place. They also, who had learned the rudiments of astronomy by books, if they entertained more enlarged views of this subject, were still frequently at a loss in the contemplation of the heavens; and my view has been to draw both parties to use their own eyes with better discrimination, being convinced, that they will derive both pleasure and improvement in tracing the motions of the heavenly bodies, as they are described in my monthly survey.

But I confess myself, that I should not be satisfied if my little Work was generally considered as contributing only to amusement; and it is some satisfaction to me to find, that more than one person has been led by the perusal of it to view the heavens with a considerable degree of care and attention; to examine them with a more than usually critical eye; to notice the different aspects under which some stars or groupes of stars appear now, from what they have been represented in former maps or planispheres; to observe the colours and apparent magnitudes of stars; to notice double or triple stars, and that very curious phenomenon, the changes in the magnitudes of some of them. From one gentleman in particular, who favoured me with his observations on the last comet, I hope to receive and to be able to communicate a considerable degree of information hereafter on these subjects; and when they become more generally familiarized to observers, instead of being confined to the few, who can have observatories, a very considerable accession to our science may be expected.

It is not merely amusement, nor the enlargement of our minds from the contemplation of the heavenly bodies, that is to be expected from the cultivation of astronomy. In a national point of view it is of no small importance. Many of my readers have probably friends or relatives, who are traversing the seas, and to whom the knowledge of the heavens is more peculiarly necessary. They are guided in their course by the Sun, Moon, or Stars, from the former of which they are enabled to discover their latitude, and from the situation of the Moon with respect to the Sun or certain stars to discover their longitude. For this purpose, as I have before observed, they take with them to sea books furnished by observatories. For this country, that of Greenwich, for the French, that of Paris, supplies them with annual works, by which they are directed in their course. Ours goes by the name of the *Nautical Almanack*, that of Paris by the name of *Connaissance des Tems*. Both are valuable publications, but both require caution in the use of them, and both may be very useful in the detection of each other's errours.

I have now before me the Nautical Almanack for the year 1820, of which several copies are probably in different parts of the world, whose possessers may not be aware of the real state of this volume. But many copies will be purchased after this reaches the eye of the reader, who will do well to caution such of his friends, as use them, to make those necessary corrections, which if he fails of doing, he may in the use of them be under some perplexity. If we notice the Moon's approach or recess from certain stars with a degree of curiosity or pleasure, and if we are told, that it is east when it should be west, north when it should be south, or *vice versa,* it is of no great consequence. But to the sailer it is otherwise. If the distance of the Moon at a certain hour of the night from a certain star is erroneously placed, it is fatal to his calculations, and may make an errour in his longitude of a hundred or two of miles. No one then, who has a friend at sea, would wish him to be exposed to such a hazard; and it becomes us all to prevent as much as in us lies the probability of an errour becoming fatal to him, either in his person or property.

Some time after the publication of the Nautical Almanack for 1820, appeared a list of errata in that volume. I do not know whether a second list has been published: that before me is contained in four octavo pages, and the number of errours noticed in it amounts to one hundred and sixty. Of these, some are of greater, some of less importance; some of great consequence to the sailer, others to the mere astronomer. But my reader will do well, if he has a friend going to sea, and intending to use the Nautical Almanack, to do as I have done to some, to warn him particularly to take the list of errata with him; and to correct his volume throughout by it before he uses it. This may save him some inconvenience, that he might otherwise be exposed to in his voyage; and from the nature of the errours he may not only be led to notice the cause of them, but in his future observations be set on his guard, if there should be an errour, which may have escaped the eye, that has favoured us with this list. A little attention may perhaps lead him to correct for himself; and if the teachers of navigation make the proper use of the Nautical Almanacks for 1819 and 1820, they may, by selecting their examples from those places where errours have been committed, teach their pupils where the errour lies, and how they might have corrected it themselves. Having corrected one by the process, which they will point out to their pupils, they will shew to them, by recourse to the list of errata, how near they may come from the tables themselves to a proper correction of similar errours. We do not aim at ,the accuracy of the two observatories, but will now point out in a more general way the appearances in the heavens for the month of January.

JANUARY, 1820.

THE latitude of the Moon, on the 1st at noon, is four degrees forty-eight minutes north, in the twenty-second degree of the fourth sign (♋); and it decreases to the 7th, when she passes the ecliptick in her descending node, between five and six in the afternoon, in the sixth degree of the seventh sign (♎). Her southern latitude now increases to the 14th, when it is at noon little more than five degrees, in the seventh degree of the tenth sign (♑); and it then decreases to the 20th, when she passes the ecliptick in her ascending node between nine and ten before noon, in the fourth degree of the first sign (♈). Her northern latitude thence increases to the 27th at noon, to nearly five degrees four minutes, in the seventh degree of the fourth sign (♋); and it decreases afterwards to the end of the month, being, on the last midnight, about two degrees and three quarters, in the first degree of the sixth sign (♍).

The Moon rises, on the 1st, about three quarters of an hour after Sun-set, under the two first of the Twins, and near to the second (β) of this constellation. Mars follows her about half an hour after, and her recess from the two stars, and approach to the planet, will be the chief feature of her course during her long stay above the horizon. Her progress is comparatively speaking slow, as will be noticed by those who observe it at different intervals. On the 2d, she follows Mars in her rising, having passed near to him at twenty minutes past seven this morning. Near to but above her is the third (γ) of the Crab, and from this and the fourth (δ), between which stars is the noted nebula, she recedes slowly, forming with the two first stars of the Twins and Mars a groupe, which will be a pleasing object to the commonest observer. On the 3d, she rises under the small stars in the head of the Lion, Mars and the two first of the Twins being at some distance above her. She will be perceived to direct her course slowly to the first of the Lion, which she will have passed before her next appearance. On the 4th, she rises soon after (Regulus) the first of the Lion, and her recess from this star in the barren space of this constellation is the chief feature in her course. On the 5th, she rises nearly with (β) the second of the Lion, being nearly at equal distances from this star and the first, now at some distance above her. On the 6th, she rises under and near to (β) the second of the Virgin. On the 7th, she rises under the five stars in triangle of the Virgin, the third (γ) of this constellation being the nearest to her; and during her course in the morning of the 8th will be seen to direct it to the first (α, or Spica Virginis).

On the 9th, the Moon rises in the morning under and near to the first of the Virgin, as she passed very near to this star about three quarters of an hour before her rise. She will be seen therefore to recede slowly from it, directing her course under the tenth and eleventh of this constellation. On the 10th, she rises below the tenth ($\varkappa$) and the eleventh (λ) of the Virgin, the latter star being the nearest to her, and we shall soon notice the two first stars of the Balance to the west of her, the first of the Virgin being now at some distance to the east. On the 11th, she rises under the two first stars of the Balance (α), the first being nearest to her. On the 12th, she rises under the second (β) of the Scorpion, and is soon followed by Antares, as she will pass this star at about twenty minutes before noon. On the 13th, she rises under him, this star being to the west of her: and on the 15th is new Moon, at fifty-three minutes past four in the afternoon, but from her great southern latitude without an eclipse.

On the 16th, the crescent of the Moon is seen for a short time soon after Sun-set to the west of south-west, in the lower part of the lower region, being between the two first stars of the Goat and the four smaller stars in the tail; Jupiter and Venus, to whom she is directing her course, being at some distance above her, and Saturn, near to whom she will also pass, being considerably farther off. On the 17th, she is perceived to have passed the four small stars in the tail of the Goat, as they are below her, Jupiter and Venus being to the west of her; and this groupe will form a beautiful object in the south-west. On the 18th, she is seen under the four stars in triangle of the Water-bearer, Jupiter and Venus being now at some distance below her: she is directing her course to Saturn. On the 19th, she passes Saturn about eight o'clock at night, Venus and Jupiter being now under the horizon, but the three planets, with the Moon, had previously attracted the attention of all, who had a good horizon to the south-west.

On the 20th, the Moon is on the meridian about Sun-set, having now Saturn below her to the west, and near to the meridian; also to the west, and at some distance above her, the four stars in square. On the 21st, she is on the meridian at ten minutes past five, the three first stars of the Ram being above her, and near to it to the east, in the following order: (α) the first the highest and farthest from the meridian; (β) the second below and nearest to the first; (γ) the third the lowest and nearest to the meridian. On the 22d, she is on the meridian at fifty-seven minutes past five, the three first stars of the Ram being above her, but now to the west of it; and nearest to the meridian is (α) the first. Below her to the east is Menkar, the first of the Whale, near to which, but to the west, is (γ) the third of this constellation. On the 23d, she is on the meridian at three quarters past six, the Pleiades being above her to the east, and Menkar, with the third of the Whale, near to the meridian to the west, (γ) the third being the farthest from it. On the 24th, she is on the meridian at half past seven, the Pleiades being now near to her to the west, and below her to the east Aldebaran, surrounded by the Hyades, of which the nearest to the meridian is (γ) the third of the Bull, and the highest (ε) the fifth of this constellation.

On the 25th, the Moon is on the meridian at twenty-nine minutes past eight at night, (β) the second of the Bull being above and near to her to the east, and Aldebaran with the Hyades below her to the west. Below her to the east at some distance is Orion. Of the two highest bright stars in this constellation, that nearest to the meridian is (γ), the third, and the lowest of the bright stars and nearest to the meridian is (β) the second, or Rigel, being called by this latter name because it is in the foot of this constellation, and Rigel, with some variation of the pronunciation, is Hebrew or Arabick for foot: she is directing her course to Mars at a considerable distance from her to the east. On the 26th, she is on the meridian at twenty-two minutes past nine, the two stars in the horns of the Bull being to the west of her, (β) the second at nearly the same height, and (ζ) the sixth below her and nearest to the meridian. The brightest star in Orion, (α) the first, is almost directly below her and near to the meridian to the west. We cannot fail of distinguishing the three bright stars in the belt or middle of this constellation, (ζ) the sixth being nearest to the meridian; the middle of them is (ϵ) the fifth, and the other is (δ) the fourth. Below these the three small stars of the Sword will attract attention, and a common telescope will discover that the middle of them is a nebula. In the lower region to the east, Sirius, the brightest star in the heavens, attracts our notice, and middle way between it and the meridian (β) the second of the Great Dog.

On the 27th, the Moon is on the meridian at a quarter past ten, having above her to the east the two first stars of the Twins, below and near to which is Mars; and this groupe has before this time attracted our notice. In the lower region, Sirius is now near to the meridian on the west, and the bright star lower down to the east of it is (δ) the fourth of this constellation. On the 28th, she is on the meridian at six minutes past eleven, the two first stars of the Twins being above and near to her to the west, (β)

the second, or Pollux, being the nearest to her, and (α) the first, or Castor, the more remote. These names will bring to your recollection the vessel, in which the great missionary to the idolatrous nations sailed on the Mediterranean. Below her, about mid heaven, but west of the meridian, is (α), or Procyon, the first of the Lesser Dog, above which is (β) the second of this constellation. The passage of the Moon above Mars, and below Castor and Pollux, forms a beautiful feature in her course this night. On the 29th, she is on the meridian at fifty-four minutes past eleven, when she is directly above the two stars with the included nebula of the Crab. Below her, at some distance, are the small stars in the head of the Hydra. We perceive that she has travelled with no great speed from Mars.

On the 30th is full Moon, at three quarters past five in the morning, but from her too great northern latitude without an eclipse. In the evening she rises with the small stars in the head of the Lion, the two first stars of the Twins and Mars being now at a considerable distance from her. On the 31st, she rises under and near to (η) the seventh of the Lion, and is soon followed by (α) the first, or Regulus, below her, which she will soon be seen to have passed, and to be advancing into the barren space in the constellation of the Lion.

Mercury is a morning star the whole of this month. His latitude, on the 1st, is three degrees five minutes north, in the twenty-third degree of the ninth sign (♐); and it decreases to the 23d, when he passes the ecliptick in his descending node, in the eleventh degree of the tenth sign (♑); and his southern latitude increases to the end of the month, when it is fifty-eight minutes, in the twenty second degree of this sign. His motion is direct. On the 1st, his height above the horizon at Sun-rise is under ten degrees; and when at his greatest elongation, on the 13th, very nearly the same. He is first to be seen, and will be seen by the keen astronomer, in the barren space between the eastern and western branches of the Milky-way, to the west of (μ) the twelfth of the Archer, under which star he passes on the 15th, directing his course to the small stars in the head of this constellation, passing (ν) the thirteenth, on the 23d; and he finishes his course about the middle of the barren space between the heads of the Archer and the Goat. The Moon passes him on the 13th.

Venus is an evening star. Her latitude, on the 1st, is one degree and a half south, in the first degree of the eleventh sign (♒); and it increases to about thirty-seven minutes on the 18th; and her motion being direct during the whole month, she is at the end of it in the ninth degree of the twelfth sign (♓). We see her first in the south-west, in the lower region, under the two first stars of the Goat, Jupiter being at some distance above her, to whom she is directing her course, and these two beautiful planets will amuse many a spectater, who, casting only a cursory eye at them, is pleased with their splendour, but attends little to their motions. Her path lies through a barren space, in which she meets nothing worthy of notice till the 17th, when she passes the western of the two highest of the four small stars in the tail of the Goat (γ), and the next day (δ) the fourth of this constellation; on the 18th, she passes Jupiter, at the distance of only forty-seven minutes to the south of him. Under the two planets we notice the four small stars in the tail of the Goat, from which Venus receding directs her course to (λ)

the eleveth of the Water-bearer, near to and under which she finishes it. On the 27th, she passes under and near to (σ) the eighteenth of the Water-bearer. The Moon passes her on the 17th.

Mars rises about half past five in the evening of the 1st, and every evening earlier, affording ample time for observations upon him; and as he is in opposition on the 16th, his splendour will be great. His latitude, on the 1st, is three degrees fifty-six minutes north, in the second degree of the fifth sign (♌). His motion is retrograde, and on the last day his latitude is about four degrees and a quarter north, in the twentieth degree of the fourth sign (♋). He rises at first in north-east-by-east, at some distance under the two first stars of the Twins, and is soon followed by the two small stars and included nebula of the Crab. From these he is perceived to recede, directing his course under the two first of the Twins, passing between the two small stars of the Crab, (ψ) the twenty-third, and (μ) the twelfth, on the 14th, being about a degree from the former star. Continuing his course from these stars, he finishes it under (β) the second of the Twins, and about two degrees from this star. The Moon passes him on the 2d, and again on the 28th.

Ceres is on the meridian about midnight of the 21st, and consequently affords very favourable opportunities of discovering her this month. Her latitude, on the 1st, is ten degrees twelve minutes north, in the tenth degree of the fifth sign (♌); and it increases during the whole month, being on the last day somewhat more than twelve degrees and a quarter, in the fourth degree of this sign, her motion being retrograde. She will be discovered therefore first to the west of the small stars in the head of the Lion, between (κ) the tenth of this constellation, the most western of these stars, and the small stars called (ρ) in the Crab: to these latter stars she is slowly approaching, and she reaches them about the 10th, passing between the first of them and the small star in the foot of the Lynx; and she finishes her course above and near to (ι) the tenth of the Crab, being between that star and the two (σ) of the Lynx. A telescope of ordinary power will discover her. The Moon passes her on the 3d, and again on the 29th.

Jupiter is an evening star. His latitude, on the 1st, is fifty minutes south, in the nineteenth degree of the eleventh sign (♒); and his motion is direct through about seven degrees, with nearly the same latitude. He is first seen above and near to (γ) the third of the Goat, and he passes (δ) the fourth on the 8th, thus marking out distinctly to us the two highest of the four small stars in the tail of this constellation. Proceeding from them he passes (μ) the twelfth on the 16th. The chief feature in his course is the passage of Venus by him on the 18th, and these two magnificent planets decorate the lower region of the western hemisphere during the whole of the month. The Moon passes him on the 17th.

Saturn is on the meridian about five o'clock in the evening of the 1st, and every succeeding evening earlier. His latitude, on the 1st, is two degrees sixteen minutes south, in the twenty-sixth degree of the twelfth sign (♓); and his motion is direct through two degrees, with a small decrease of latitude. We see him therefore, when on the meridian, under the four stars in square, but nearest to the line drawn through the two eastern of these stars and produced. The Moon passes him on the 19th.

Herschel is a morning star. His latitude, on the 1st, is nine minutes south, in the twenty-sixth degree of the ninth sign (♐); and his motion is direct through about a degree and a half, with nearly the same latitude. His nearness to the Sun and small height above the horizon at Sun-rise will prevent many observations on him in the former part of the month, but towards the middle of it the telescope will be directed to him under and to the west of (μ) the twelfth of the Archer. He enters the western limb of the eastern branch of the Milky-way about the 21st. The Moon passes him on the 13th.

This month is distinguished by five planets being above the horizon at the same time, Venus, Jupiter, Saturn, Mars, and Ceres, in this order, from west to east; and about the 20th, they will be all discernible together soon after Sun-set; the latter planet being however too near the horizon to have many observers.

The Sun's apparent diameter, on the 1st, is thirty-two minutes thirty-five seconds and a half; and on the 19th, thirty-two minutes thirty-four seconds. The Moon's diameter, on the 4th, is during the whole day about twenty-nine minutes and a half; and it thence increases to the 16th, when it is about thirty-three minutes twenty-two seconds; and it decreases to the last day of the month, when it is twenty-nine minutes twenty-six seconds. The Sun enters the eleventh sign (♒) on the 21st, at twenty-eight minutes past one in the morning.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
X.	4	43	4	12	3	38		
XI.	6	44	6	13	5	39	5	5
XII.	8	50	8	19	7	45	7	11
I.	10	40	10	9	9	35	9	1
II.	0	43	0	12	11	38	11	4
III.	2	32	2	1	1	27	0	53
IV.	4	53	4	22	3	48	3	14
V.	6	44	6	13	5	39	5	5
VI.			8	9	7	35	7	1

FEBRUARY, 1820.

THE establishment of observatories in different parts of the world, and the communication of their observations and calculations, is a very great advantage to astronomy, and after a course of years will lead to some important results. In their calculations they go on certain principles, and from the near coincidence of the place of the Sun, Moon, and Planets by actual observation, with that assigned to it by calculation, there cannot be a doubt that the principles on which they go are not far from the truth. I must however be not misunderstood on this head. For these calculations will be the same, provided the relative distances of the Planets from the Sun are preserved; but, whether the absolute distances of these bodies are as they are stated in the books, is a question, that may in a future age be determined very differently from what it is at present. The variation in these distances, as assigned at different preceding ages, is very great, and there may be something not hitherto discovered, which may have rendered our mode of calculation as fallacious as that, which was employed by our predecessers. Time tries the truth: and after a sufficient number of transits of Mercury and Venus over the Sun's disk, which in the revolution of ages will be observed with improved accuracy, the distances of the Planets from the Sun may perhaps be ascertained with such precision as to leave little or no doubt upon the subject.

The two observatories of Greenwich and Paris are so near to each other, that the calculated longitudes of the Sun at noon, and the longitudes and latitudes of the Moon at noon and midnight in each place, must very nearly correspond; and the same may be said, with due allowance, on a more important point to navigation, the distances of the Moon from the Sun and certain fixed stars. Hence a very great degree of security is held out to the mariner; and the expense of providing himself with the two works, the Nautical Almanack and the Connaissance des Tems, is so small, that he should not go to sea on a long voyage without previously procuring these volumes, and comparing them with each other. The utility of this precaution will be seen by an instance or two.

Let us suppose a person to have these two volumes out at sea with him, and to have made the necessary observations on the Moon's distance from Antares, when it is nine o'clock in the morning on the 7th of January at Greenwich, according to his observed distance of the Moon from the star and the distance given in his book: his observed distance is sixty-five degrees five minutes fifty-nine seconds, the same as is placed for that hour. Let the time with him be six in the morning. Consequently, the difference in the time being three hours, his longitude is fifteen degrees. But on comparing together his two books he finds, that the distance of the Moon from Antares at nine o'clock in the morning of this day at Paris is sixty-five degrees fifty-six minutes thirty-four seconds. They cannot both be right. The question is, which should he depend upon? Shall he calculate his longitude from Paris or from London by these tables? and if he takes his longitude from the Parisian tables, and then converts it into longitude from Greenwich, he will necessarily find a great disagreement between the longitude thus found and that given by the Nautical Almanack. The question then is to find where the errour lies, and the quantum of errour.

An easy mode of doing this is as follows: — Take the distances of the Moon, as given in the two works at their respective hours. Thus, at noon,

Nautical Almanack gives	76	21	4
Connaissance	76	25	32
Difference is...........		4	28

At three o'clock afternoon,

Nautical Almanack...........	74	51	37
Connaissance	74	56	7
Difference		4	30

At six o'clock,

Nautical Almanack	73	22	2
Connaissance	73	26	33
Difference...............		4	31

At nine o'clock,

Nautical Almanack...........	71	52	20
Connaissance	71	56	51
Difference..............		4	31

At midnight,

Nautical Almanack…………	70	22	29
Connaissance …………………	70	27	1
Difference……………		4	32

At three in the morning of the 7th,

Nautical Almanack…………	68	52	29
Connaissance …………………	68	57	3
Difference……………		4	34

At six o'clock,

Nautical Almanack…………	67	22	19
Connaissance …………………	67	26	53
Difference……………		4	34

At nine o'clock,

Nautical Almanack…………	65	5	59
Connaissance …………………	65	56	34
Difference……………		50	35

Now in the instances preceding that at nine in the morning, the difference is only about four minutes and a half, and therefore at this time the difference must be nearly the same. Consequently, if we subtract four minutes and a half from the Parisian distance, it leaves us 62° 51′ 2″ for the Greenwich distance, in which, as we see the figure 5 in the place of minutes, it will leave us no doubt, that there must be in this table an errour, and that the minutes ought to be either fifty or above fifty. Now the preceding difference was four minutes thirty-four seconds; and if we take this as the near difference in our case, and subtract it from the Parisian distance, 65° 56′ 34″, it leaves us sixty-five degrees fifty-two minutes for the real distance at Greenwich.

That we are very near the truth there can be little doubt. But whether the errour from it is in excess or defect, is another question. This may be considered by observing the differences in the preceding times of observation, and these we observe to have been increasing. Consequently, if the last difference, namely, that at six in the morning, were correct, the difference at nine must be somewhat greater, and consequently our errour is in excess, and the true distance must be somewhat less than sixty-five degrees fifty-two minutes.

To see whether we come nearer to the mark, let us push our observations a little farther.

At noon on the 7th,

Nautical Almanack............	64	21	28
Connaissance	64	26	4
Difference..............		4	36

Now the difference at six in the morning being four minutes thirty-four seconds, and at noon four minutes thirty-six seconds, we may safely say, that the difference at nine in the morning was four minutes thirty-five seconds; we therefore subtract this quantity from the Parisian distance, namely, 65° 56′ 34″, and it leaves us for the Greenwich distance 65° 51′ 59″; and this is the distance corrected in the list of errata by the editors of the Nautical Almanack.

The editors of the Nautical Almanack, it is pretty evident, did not correct the errour by this process; but I am inclined to believe, that they detected the errour by means of the Connaissance des Tems, and then they had nothing to do but to look at their manuscript, which I have little doubt gave the true reading, 65° 51′ 59″.

I must observe, that I did not come to the exact correction of the errour by any notice of what was done in the list of errata. In this case, the errour was completely rectified by the legitimate process, that I have adopted, and I recommend it to the particular notice of all concerned in the navigation of vessels, or in teaching the mode of discovering the longitude by lunar observations. My readers also will do well to teach it to their friends, who are going to sea; and having imposed so easy a task upon them, I now proceed to my observations on the appearances in the heavens for this month.

The Moon's latitude, on the 1st at noon, is two degrees eighteen minutes north, in the seventh degree of the sixth sign (♍); and it decreases till the 3d, when she passes the ecliptick in her descending node, between six and seven in the afternoon, in the fourth degree of the seventh sign (♎). Her southern latitude increases to the 10th, when it is at noon five degrees nine minutes, in the thirtieth degree of the ninth sign (♐); and it then decreases to the 16th, when she passes the ecliptick in her ascending node, between four and five in the afternoon, in the fourth degree of the first sign (♈). Her northern latitude now increases to the 23d, when it is nearly five degrees thirteen minutes, in the fourth degree of the fourth sign (♋); and it decreases afterwards to the end of the month, when it is, at midnight, about one degree, in the twenty-first degree of the sixth sign (♍).

The Moon rises, on the 1st, about seven in the evening, and every day later by upwards of an hour, under the first of the Lion and Mars, and is afterwards perceived to be directing her course above the second of the Virgin. On the 2d, she rises with the small stars in the head of the Virgin, and is followed by the second of this constellation, which she will soon be seen to pass. On the 3d, she rises under (η) the seventh of the Virgin, and will pass under (γ) the third before she sets, directing her course to the first of the Virgin. On the 4th, she rises under the five stars in triangle of the Virgin, and reaches the first of the Virgin a little before Sun-rise. On the 5th, she rises with (κ) the tenth of the Virgin, and under the first; and, during the morning of the 6th, we perceive her travelling under the tenth and (λ) the eleventh of the Virgin, but she does not arrive at the latter star before Sun-rise.

On the 7th, the Moon rises in the morning soon after (α) the first of the Balance, directing her course to Antares. On the 8th, she rises with (β) the second of the Scorpion, and, directing her course to Antares, reaches (δ) the fourth about Sun-rise. On the 9th, she rises soon after Antares, now to the west of her. On the 10th, she rises with (λ) the eleventh of the Archer, to the east of her, under which star she is directing her course; and on the 14th, at sixteen minutes past three in the morning, is new Moon, but with too great southern latitude for an eclipse.

On the 15th, the crescent of the Moon is seen under Saturn and Venus, and nearest to the latter planet; but she will have passed them both before her next appearance. On the 16th, she is seen above Venus and Saturn, having passed the former planet about half past seven in the morning, and the latter at twenty-three minutes past ten. On the 17th, she is perceived to have travelled with great rapidity from the two planets, being seen above (ε) the fifth and (ζ) the sixth of the Fishes, but nearest to the latter star. On the 18th, she is seen under the three first stars of the Ram, and nearest to (γ) the third of this constellation. On the 19th, she is seen under the small stars in the tail of the Ram. The small star just above her is (ε) the fifth of this constellation, and she passes (δ) the fourth before Moon-set.

On the 20th, the Moon is on the meridian at twenty-nine minutes past five in the evening, having the Pleiades very near to her to the west, and she will be seen slowly receding from them till Moon-set. On the 21st, she is on the meridian at twenty-three minutes past six, having the Pleiades below her to the west, the second of the Bull nearer to her to the east, and Aldebaran and the Hyades almost directly below her, being near to the meridian to the west. On the 22d, she is on the meridian at seventeen minutes past seven, having Orion directly below her, whose principal stars may now be pointed out with great facility to the younger students, the three stars in the belt being on the meridian; (α) the first and highest to the east, (γ) the third near to the meridian, and (β) the second farther from the meridian, both to the west. To the east of her at some distance is Mars; to the west of her are also the two stars in the tips of the Bull's horns, that on the southern horn, (ζ) the sixth, being below her and near to the meridian. On the 23d, she is on the meridian at ten minutes past eight, having almost directly beneath and near to her (ε) the fifth of the Twins; and at some distance below it (γ) the third, known by its brightness, next to the two first, is in a line nearly between them and the first of Orion, but nearest to the latter star. Above her to the east, at some distance, are the two first of the Twins, and under them Mars, by whom she will have passed and near to him before her next appearance. On the 24th, she is on the meridian at two minutes past nine, having above and near to her the second of the Twins, the first being near to the meridian to the west. Mars is below her to the west, as she passed him about two this afternoon.

On the 25th, the Moon is on the meridian at fifty-one minutes past nine at night, Mars and the two first of the Twins being now at some distance from her to the west, and the two small stars with included nebula of the Crab, below and near to her to the east: these she will pass about Moon-set. On the 26th, she is on the meridian at thirty-seven minutes past ten, being under the small stars in the head of the Lion, (λ) the eleventh, and nearest to her, being near to the meridian to the east, (κ) the tenth on it above, and (ε) the fifth near to and to the east of the eleventh, above which is (μ) the twelfth. On the 27th, she is on the meridian at twenty minutes past eleven, being between (η) the seventh and Regulus the first of the Lion; and before this time we shall discern her approach to these stars, the superior brightness of Regulus being a sufficient distinction.

On the 28th, the Moon rises before Sun-set, and sets after Sun-rise, coming to the full in her course, which takes place at fifty-four minutes after midnight of this day, but with too great a northern latitude to admit of an eclipse. During her long stay above the horizon she moves slowly in the barren space in the body of the Lion. On the 29th she rises under the stars in the Lion, directing her course to the second of the Virgin.

Mercury is in his superior conjunction on the 29th, and consequently a morning star during the greater part of the month, but the unfavourableness of his position and southern latitude will permit him to be detected by few observers. His latitude, on the 1st, is one degree five minutes, in the twenty-fourth degree of (♑) the tenth sign; and it increases to the 19th, when it is two degrees seven minutes, in the twenty-third degree of (♒) the eleventh sign. It then decreases to the end of the month; being on the last one degree and three quarters, in the eleventh degree of the twelfth sign. The Moon passes him on the 13th.

Venus is an evening star. Her latitude, on the 1st, is one degree twenty-six minutes south, in the tenth degree of the twelfth sign; and it decreases to less than half a degree on the last day, in the fourteenth degree of the first sign. We see her first under and near to (λ) the eleventh of the Water-bearer, the small star on the western edge of the stream flowing from his urn, which she passes with great rapidity, being seen on the 6th, at the eastern edge under and near to but to the west of (φ) the twenty-first of the Water-bearer. On the 4th, a telescope of small power will point out clearly a small cluster of stars under her, below which to the east are the three small stars called (ψ) or the twenty-third of the Water-bearer. She directs her course, after passing the stream, through the barren space under the four stars in square to Saturn, to the east of her, and she passes above him on the 18th, the two planets being nearly in a line with the two eastern of the four stars in square above them. After this conjunction she proceeds through a barren space to the small stars in the band of the Fishes, finishing her course under and near to (ε) the fifth of this constellation; and near to her to the east will be seen through a common glass some small stars of no note. The Moon passes her on the 16th, at about half past seven in the morning.

Mars is on the meridian at about half past ten at night of the 1st, and about nine on the 20th. His latitude, on the 1st, is four degrees seventeen minutes north, in the fourth degree of (♋) the fourth sign; and it decreases to nearly three degrees and a half, in the seventeenth degree of this sign, his motion being retrograde through about three degrees and a quarter. We see him at first therefore under and near to the second of the Twins, and he moves slowly under the two first stars, receding westward from the second, passing under (υ) a small star on the 13th, and finishing his course near to (A) a small star to the west of and above him. The Moon passes him on the 24th.

Ceres is on the meridian about half past eleven at night on the 1st, and about half past nine on the 25th. Her latitude, on the 1st, is twelve degrees twenty-six minutes north, in the fourth degree of the fifth sign (♌); and it increases to twelve degrees thirty-eight minutes, in the first degree of this sign, on the 17th; and then decreases nearly five minutes, in its last place, in the twenty-ninth degree of the fourth sign (♋): her motion being retrograde through nearly four degrees and three quarters. She is seen therefore moving slowly in the barren space above the highest claw of the Crab, receding slowly from the small stars in the foot of the Lynx. The Moon passes her on the 25th.

Jupiter is an evening star, till the 19th, when he is in conjunction with the Sun, and after it too near him to be visible as the morning star. His latitude, on the 1st, is fifty-one minutes south, in the twenty-sixth degree of (♒) the eleventh sign; and it increases about a minute, his motion being direct through about seven degrees. From his favourable position we shall see him at first for a short time after Sun-set, but he will soon be lost in the solar rays. The Moon passes him on the 14th.

Saturn is an evening star. His latitude, on the 1st, is two degrees eleven minutes south, in the twenty-eighth degree of the twelfth sign (♓); and it diminishes about two minutes, his motion being direct through nearly three degrees. He will be seen therefore to be approaching the line drawn through the two eastern of the four stars in square, and produced; and the chief feature in his course through a barren space is the passage of Venus by him. The Moon passes him on the 16th.

Herschel is a morning star. His latitude, on the 1st, is ten minutes south, in the twenty-eighth degree of the ninth sign (♐); and it remains nearly the same the whole month, his motion being direct through little more than a degree. The twelfth (μ) of the Archer is the best direction to him, below which to the west a telescope of ordinary power cannot fail of discovering him. The Moon passes him on the 10th.

The Sun's apparent diameter is thirty-two minutes and a half on the 3d, and thirty-two minutes twenty-four seconds on the 19th. The Moon's apparent diameter, on the 1st at midnight, is twenty-nine minutes and a half; and on the 4th at midnight, half a degree. It continues to increase to the 13th, when it is at midnight, thirty-two minutes thirty-two seconds; and it then decreases to the 27th, being on the whole of that day about twenty-nine minutes twenty-six seconds. It then increases to the end of the month, being, on the last midnight, twenty-nine minutes thirty-four seconds. The Sun enters the twelfth sign (♓), at eight minutes past four in the afternoon of the 19th.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		15		22	
	h.	m.	h.	m.	h.	m.	h.	m.
XI.	4	32	4	4				
XII.	6	38	6	10	5	42	5	15
I.	8	28	8	0	7	32	7	5
II.	10	31	10	3	9	35	9	8
III.	0	20	11	52	11	24	10	57
IV.	2	41	2	13	1	45	1	18
V.	4	32	4	4	3	36	3	9
VI.	6	28	6	0	5	32	5	5

MARCH, 1820.

I THINK, that I have made it appear very clearly, that with the two publications, the Nautical Almanack, and the Connaissance des Tems, a mariner may go to sea with a considerable degree of confidence. But he must not rely entirely on this advantage; for the case may occur, that an errour is in the Nautical Almanack, when the Connaissance des Tems does not afford him that assistance, which is pointed out by the example noticed in the last month. For there are distances of the Moon from a fixed star in the Nautical Almanack, which have no corresponding distances in the Connaissance des Tems. It will be of use therefore to show the mariner, how he may detect and correct the errour in the Nautical Almanack, without applying to the Parisian observatory; and as the subject is of so much importance to the navigation of our vessels, our time will not be ill bestowed in making this clear to the reader. We will take the instance given last month, as thus it will be shown how nearly we come to the same conclusion, by means of the Nautical Almanack alone; and this will be of use, not only in this case, peculiarly belonging to navigation, but to many other cases in which the astronomer only is concerned.

The distances of the Moon from Antares, on part of the 6th and 7th of January were as follows;—

On the 6th,

At noon	76	21	4
At three afternoon	74	51	37
Difference	1	29	27
At three afternoon	74	51	37
At six	73	22	2
Difference	1	29	35
At six afternoon	73	22	2
At nine	71	52	20
Difference	1	29	42

At nine afternoon	71	52	20
At midnight	70	22	29
Difference	1	29	51
At midnight	70	22	29
At three in morning of 7th	68	52	29
Difference	1	30	0
On the 7th,			
At three in the morning	68	52	29
At six	67	22	19
Difference	1	30	10
At six	67	22	19
At nine	65	5	59
Difference	1	16	20
At nine	65	5	59
At noon	64	21	28
Difference	0	44	31

Here we observe, that the difference in the distances, taken by three hours, is continually increasing; but it is between one degree twenty-nine minutes, and one degree and a half, till after three in the morning of the 7th. Consequently we may take it for granted, that one degree and a half must be near the difference in the two last instances: and as we find the differences in these last instances at so great a variance from all the rest, we must be convinced that there is an errour in them. It is evident also, that the errour must be in the first of the two, namely, 1° 16′ 20″, and this is to be corrected.

To do this we must consider the nature of the preceding differences, and as we have noticed that they increase, we will now try in what manner they increase; and to do this we will write them down in their order, and take the differences between them.

No.	Differences.			Differences of these differences.		
1	1	29	27	0	0	8
2	1	29	35	0	0	7
3	1	29	42	0	0	9
4	1	29	51	0	0	9
5	1	30	0	0	0	9
6	1	30	10	0	0	10
7	1	16	20	——		
8	0	44	31	——		

The differences between the differences lead us naturally to imagine, that the difference between the Nos. 6 and 7, must be either ten or eleven seconds, and either of these latter numbers will be sufficient for us. Let us take ten seconds for the first, which, being added to No. 6, will give us for No. 7, 1° 30′ 20″; and eleven for the other, *i. e.* No. 7, 1° 30′ 31″.

Instead therefore of the difference between the distances, at six and nine in the morning of the 7th, being 1° 16′ 20″, we will suppose it to be 1° 30′ 20″; and instead of that between nine in the morning and noon being 0° 44′ 31″, we will suppose it to be 1° 30′ 31″.

Hence we correct the two distances in the following manner:—

Distance at six in morning of the 7th.	67	22	19
Difference between this and distance at nine	1	30	20
Distance at nine	65	51	59

Supposing then our distance at nine to be properly corrected, we will in the same manner find the distance at noon thus:—

Distance at nine	65	51	59
Difference between distance at nine and noon	1	30	31
Distance at noon	64	21	28

Now the distance at noon, thus found, corresponding exactly with the distance given for that time in the Nautical Almanack, we cannot, I think, hesitate in saying, that the distance at nine in the morning ought to have been in the Nautical Almanack 65° 51′ 59″.

Thus without using the Parisian tables we come to the same conclusion as we did by the use of them; and this confirmation will give the mariner, who has both works, such a confidence in his conclusion, that he cannot hesitate in making the correction as we have done; and if he has only the Nautical Almanack he will be perfectly satisfied, that he may use the tables with our correction with the confidence, that the errour, if there were any in it, must be very insignificant.

What I have thus done may be performed in any vessel in a very short time, and with so little trouble, that it is sufficient, I think, to mention it only to have it adopted by the commanders of ships, particularly those in the service of the East India Company, in which there is such a laudable attention paid to lunar observations. In the course of the day preceding the intended observations, the distances of the Moon from the fixed star to be observed are to be written down in order, one under the other, as they are given in the Nautical Almanack for the respective hours for that star. In another and adjoining column are to be written down the differences between the numbers of the first column, and if they increase or decrease in a regular order, the table may be considered as correct; but, if there are breaks in the second column, then it is a warning to notice the distances where the breaks take place, and to apply the method above laid down to correct the table.

I may be supposed to take up too much time on a question, that relates only to navigation; but the case applies to the whole almost of the Nautical Almanack, in which, as well as the Connaissance des Tems, there are many errours, that may put an observer to great difficulties. It will also be found particularly necessary in the use of those works, which I do not doubt will be made of them in a future age. For the situation of the planets some years ago may be made use of in calculations of importance; and, if a person is not on his guard, he may, depending on his book, take out a place for the planet, which may be very erroneous. He must make use therefore of his eyes, and note the places of that planet before and after the time, in which he wishes to be accurate; or, after a laborious calculation, he may come to a conclusion, which will be evidently unsatisfactory. Every person, therefore, in his observatory, will do well to follow the example of the mariner, and to see, in every instance where accuracy is required, that the tables, which he uses, are correct. Mr. Zach has pointed out some instances, in which the Connaissance des Tems has made such slips, that the observatory of Paris must not triumph too much on the present state of its rival in England, though the remarks he has made* on the errours in the Nautical Almanack of this year, which are now circulating through Europe, may be safely recommended to the Board of Longitude.

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* ——— pudet hæc opprobria dici,
Et dici potuisse, et non potuisse refelli.

We will now leave this subject for the present, and proceed to notice the appearances in the heavens for this month.

The Moon passes the eclíptick in her descending node, on the 1st, between ten and eleven at night, in the third degree of the seventh sign (♎); and then her southern latitude increases to the 8th, when it is five degrees sixteen minutes, in the third degree of the tenth sign (♑); and it decreases to the 15th, when she passes the ecliptick in her ascending node, between two and three in the morning, in the second degree of the first sign (♈). From this time her northern latitude increases to the 21st, when it is, at noon, five degrees seventeen minutes, in the thirtieth degree of the third sign (♊); and it then decreases to the 29th, when she passes the ecliptick in her descending node, between four and five in the morning, in the second degree of the seventh sign (♎); and her southern latitude afterwards increases, till it becomes, on the last midnight, nearly three degrees, in the seventh degree of the eighth sign (♏).

The Moon rises, on the 1st, about a quarter past seven at night, under the second of the Virgin, and is soon followed by (η) the seventh, under and near to which she passes before midnight, directing her course to the first of this constellation. On the 2d, she rises under and at some distance from the five stars in triangle of the Virgin, and is perceived to direct her course to the first, which she will have passed before her next appearance. On the 3d, she rises under the first of the Virgin, having passed this star about one in the afternoon. On the 4th, she rises under the tenth and eleventh of the Virgin, but nearest to (λ), and she passes the first of the Balance about Sun-rise. On the 5th, she rises at some distance under the two first of the Balance, and is seen, during the morning of the 6th, to direct her course to Antares.

On the 7th, the Moon rises in the morning under the second of the Scorpion, and is soon followed by Antares, as she passes this star at three minutes past four. On the 8th, she rises under and at some distance from Antares, and to the west of her is (μ) the twelfth of the Archer, rising nearly with her. On the 9th, she rises under the twelfth and eleventh of the Archer, being nearly in a line with these stars, and nearest to (λ). On the 10th, she rises under the small stars in the head of the Archer to the west, and the two first of the Goat to the east of her. On the 11th, she rises under and at some distance from the two first stars of the Goat to the west of her, directing her course to the small stars in the tail to the east of her. On the 12th, she rises with the small stars in the tail of the Goat, to pass between the two highest and the two lowest, but she does not reach the nearest of the former stars before Sun-rise. On the 14th, is new Moon, at twenty-one minutes past one in the afternoon, occasioning an eclipse of the Sun, which however will be lost to the inhabitants of this country. The Sun is centrally eclipsed on the meridian, at forty-six minutes fifty seconds after noon; in longitude, eleven degrees forty-two minutes and three quarters west; and south latitude, fifty-six degrees thirty-two minutes and a quarter.

On the 15th, the crescent of the Moon is seen soon after Sun-set in the west, the favourable position of the zodiac giving her, notwithstanding her late conjunction with the Sun, such an altitude, that she is above an hour and a half above the horizon after Sun-set. The teachers of astronomy will not fail to remark this circumstance to their pupils, pointing out to them the difference, that there would have been, if the Sun and Moon had been in the same places in the opposite two signs, and the Moon with a southern latitude. Above the Moon are Venus with the three first stars of the Ram, and she is directing her course to the planet. On the 16th, the Moon is seen under the three first stars of the Ram and Venus, directing her course between them, but near to the planet, which she will have passed before her next appearance. On the 17th, she is seen above Venus, making with the planet and the three first of the Ram a groupe, that may be pleasingly described to the young astronomer. On the 18th, she is seen midway between the Pleiades and the small stars in the tail of the Ram, the former stars above, and the latter below her. She is directing her course straight to the Pleiades, reaching them about Moon-set. On the 19th, she is seen to have travelled, with considerable rapidity, from the Pleiades, which are now at some distance below her, and she is directing her course to the second of the Bull, at a greater distance above her. On the 20th, she is seen above and near to the second of the Bull, having passed this star a short time only before the stars are visible, at twenty-four minutes past six in the evening; she is receding from this star with less rapidity than she approached to it. On the 21st, she is seen above the seventh and twelfth of the Twins, being nearest to (μ) the latter star, but she does not pass the fifth (ε) till after Moon-set; and she is directing her course above Mars.

On the 22d, the Moon is on the meridian at four minutes past seven at night, having above her to the east the two first stars of the Twins and Mars; and she is directing her course to (β) the second of this constellation, the lowest of them, which she does not however reach till about three hours after Moon-set. On the 23d, she is on the meridian at fifty-five minutes past seven, having now the two first of the Twins above her to the west, and the two small stars and included nebula of the Crab below her to the east. Mars will now be observed below her to the west. On the 24th, she is on the meridian at forty-two minutes past eight, being about midway between the small stars in the head of the Lion above her to the east, and the two small stars and included nebula of the Crab below her to the west. On the 25th, she is on the meridian at twenty-six minutes past nine, having above her the small stars in the head of the Lion, (ε) the fifth and (μ) the twelfth being almost directly above her, the former to the west, the latter, the highest, to the east of the meridian; (λ) the twelfth will be noticed to the west of (ε), and (κ) the tenth above it to the west. She is directing her course to (α) the first below her, and so near, that she will pass him about three hours after Moon-set.

On the 26th, the Moon is on the meridian at seven minutes past ten at night, having Regulus the first of the Lion now to the west of her. On the 27th, she is on the meridian at forty-eight minutes past ten, having above her to the west and near to it (θ) the eighth and (δ) the fourth of the Lion, the latter, the highest, to the east; above her is (β) the second of the Lion, at a greater distance from the meridian. She is directing her course to the second of the Virgin. On the 28th, she is on the meridian at twenty-eight minutes past eleven, being nearly midway between the second of the Virgin to the west, and (η) the seventh to the east of her, and she passes under the latter star in about three hours.

On the 29th is full Moon, at forty-six minutes past six in the evening, when the Moon rises eclipsed at seventeen minutes past six. The eclipse began at nearly seventeen minutes past five, and the middle of it is at nearly thirty-eight minutes past six, and it ends at nearly fifty-nine minutes past seven. Digits eclipsed are six degrees twelve minutes, on the Moon's northern limb. To those, who have a good view of the horizon in the east, the orb of the Moon, probably much enlarged, will present a striking appearance. She rises under and near to (γ) the third of the Virgin, and during the night directs her course under the five stars in triangle to the first of the Virgin. On the 30th, she rises nearly with the first of the Virgin, having passed near to this star only about half an hour before, and she recedes slowly from this star during the night. On the 31st, she rises under the tenth and eleventh of the Virgin, and nearest to the latter star, which she passes soon after her rising.

Mercury is an evening star, at his greatest elongation on the 26th. His latitude, on the 1st, is one degree forty minutes south, in the thirteenth degree of the twelfth sign; and it decreases to the 12th, when he passes the ecliptick in his ascending node, in the fifth degree of the first sign. His northern latitude increases to the end of the month, being on the last day three degrees ten minutes, in the twenty-eighth degree of (♈) Aries, the first sign. At his greatest elongation he is above an hour and three quarters above the horizon after Sun-set, and consequently, to those who have a good horizon in the west, will afford favourable opportunities of observing him before and after the 25th. On the 15th, several will catch a sight of him, under the early crescent of the Moon, as she passed him at forty-three minutes past one in the afternoon, but it will be with difficulty, from the light spread by the solar ray on the part of the horizon near which he must be seen, if at all detected. On the 19th, he is very near to (ε) the fifth of the Fishes, and he thence directs his course to (π) the sixteenth of this constellation, under which he will be on the day of greatest elongation, and within the distance of a degree; and on the next day he will be above and near to this star; and he ends his course in a line nearly with this star and the lowest of the three stars of the Ram, giving thus many opportunities of observation to those, who have never before seen this planet, which may be discovered by a telescope of ordinary power. The solar beams are however a great obstacle to a sufficient display of this nimble attendant on the Sun.

Venus is an evening star, decorating the lower region, in the west, for a considerable time after Sun-set. On the 1st, she does not set for above three hours after the Sun; and on the last day her duration above the horizon after Sun-set is above three hours and a half. This arises from the favourable position of the zodiack, as will be explained by the teacher of astronomy to his pupils. On the 1st, her latitude is twenty-one minutes south, in the fifteenth degree of the first sign; and it decreases to the 7th, when she passes the ecliptick in her ascending node, in the twenty-third degree of this sign; and her northern latitude increases to above a degree and a quarter, in the twenty-first degree of the second sign. She is first seen under (ε) the fifth and (ζ) the sixth of the Fishes, passing (ε) soon after Sun-set of the 1st, and under and near to (ζ) on the 4th. She then directs her course through a barren space, passing between (ο) the fifteenth and (π) the sixteenth of the Fishes on the 10th. She continues her course between the Ram and the Whale, passing between the first of this constellation and the first of the Ram on the 21st, but nearest to the latter star. She then directs her course to the small stars in the tail of the Ram, passing above and near to (δ) the fourth on the 27th, and still nearer to (ζ) on the 28th, and she finishes it under and somewhat more than two degrees from the Pleiades. The Moon passes her on the 17th.

Mars is on the meridian at twenty-four minutes past eight at night on the 1st, and at half past seven on the 19th. His latitude, on the 1st, is three degrees and a half, in the seventeenth degree of the fourth sign (♋), and three degrees on the 19th, in the twentieth degree of this sign, his motion being direct through about six degrees and a half. We shall see him therefore on the 1st, under and near to (ι) the ninth of the Twins, the first being higher up to the east of it, and he moves slowly under the two first, passing the second on the 22d, directing his course to the nebula in the Crab, but finishing it nearly in a line with the two first of the Twins. The Moon passes him on the 23d.

Ceres is on the meridian about half past nine at night on the 1st, and about eight on the 27th. Her latitude, on the 1st, is twelve degrees thirty-three minutes north, in the twenty-ninth degree of the fourth sign (♋), and it decreases during the whole month, being, on the 25th, eleven degrees forty-seven minutes, still in the twenty-ninth degree, as she is stationary on the 10th, and her motion consequently very slow. She will therefore be discovered nearly in the same barren place, under the hind legs of the Lynx to the east of her, nearer to the small stars (σ) in that constellation than to the two first of the Twins to the west of her. The Moon passes her on the 22d.

Jupiter is a morning star. His latitude, on the 1st, is fifty-two minutes south, in the third degree of the twelfth sign (♓), and it increases about four minutes, his motion being direct through somewhat more than seven degrees. At first he is too near the Sun to be visible, and he scarcely extricates himself from the solar ray before the end of the month, when his height above the horizon is only about six degrees. The unfavourableness of his position, as will be explained by the teachers of astronomy, prevents him from having that splendour, which, from his distance from the Sun, he would otherwise have possessed. The Moon passes him on the 13th.

Saturn is in conjunction with the Sun on the

24th, and of course till that time an evening star; and from his favourable position visible for the first week after Sun-set, near the horizon in west-by-south. His latitude, on the 1st, is two degrees nine minutes south, in the first degree of the first sign (♈), and it continues nearly the same during his direct motion through nearly four degrees. The Moon passes him on the 15th.

Herschel is a morning star, being on the meridian about Sun-rise at the end of the month. His latitude, on the 1st, is ten minutes south, in the twenty-ninth degree of the ninth sign (♐), and it remains nearly the same during his slow but direct motion through not half a degree. The twelfth (μ) of the Archer continues to be a good direction to him, under which he is to the west about two degrees and a half. The Moon passes him on the 8th.

The Sun's apparent diameter, on the 1st, is thirty-two minutes nineteen seconds, continually decreasing; and on the 24th it is thirty-two minutes six seconds. The Moon's apparent diameter, on the 3d at noon, is half a degree; and it increases to the 13th, during which day it is about thirty-three minutes forty-two seconds.

It then decreases to the 26th, being, on that and the preceding day, about twenty-nine minutes and a half; and it afterwards increases, being, on the last midnight, half a degree and twenty-two minutes. The Sun is at the equinoctial point of (♈), at eighteen minutes past four after noon of the 20th.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
I.	6	38	6	12	5	43		
II.	8	41	8	15	7	46	7	17
III.	10	30	10	4	9	35	9	6
IV.	0	51	0	25	11	56	11	27
V.	2	42	2	16	1	47	1	18
VI.	4	38	4	12	3	43	3	14
VII.	6	38	6	12	5	43	5	14

APRIL, 1820.

THE mode of correction, which I have recommended for the errours, that have appeared already or may appear hereafter in the publications from the two most celebrated observatories in the world, has, from the instance produced, decidedly proved, that it may be depended upon. But still it may strike the reader, that he is not to be determined by a single instance, though that instance is confirmed by the correction made by the editers themselves of the Nautical Almanack. The importance of the subject will therefore justify us in trying another instance; and the Nautical Almanack for this year affords us such a quantity, that there will be no difficulty in finding one. One occurs in the distance of the Moon on the 1st of July, where the errour is so palpable, that it must strike the most superficial observer. For the distance of the Moon from a star is made to be the same in degrees both at nine o'clock at night, and at midnight. According to the plan I have proposed, the superior officer of a vessel at sea, having determined to take an observation at night of this day, of the distance of the Moon from Aldebaran, will previously have required from the inferior officers to inform him, whether the distances in the tables of the Nautical Almanack are correct or not; and they would naturally employ themselves in the investigation in the following manner:—

Time.	Distance.	Differences.
Noon	77 2 11	
		1 25 34
Three afternoon..	75 36 37	
		1 45 22
Eleven............	73 51 15	
		3 45 8
Nine...............	70 6 7	
		0 15 4
Midnight.........	70 21 11	
		1 44 42
Three morning...	68 36 29	
		1 44 27
Six.................	66 52 2	
		1 44 13
Nine...............	65 7 49	

The inspection of the column of differences shows at once a palpable errour in the degrees, for it is evident, that no one difference can exceed two degrees, and in the third line it is upwards of three degrees. On noticing that the three last differences agree so far, in being nearly one degree and three quarters, he will naturally assume that quantity as his correction for the errour in the place above mentioned. By taking this quantity from the distance at six in the morning, it leaves him 72° 6′ 15″ for his first corrected distance at nine. He subtracts the same quantity from the distance at nine, 72° 6′ 15″, and it leaves him 70° 21′ 15″ for his first corrected distance at midnight. He disregards at present the difference in seconds between his corrected distances, and those in the Nautical Almanack, and writes down 72° in the place of 70° in his first column, and makes no farther correction as yet in that column, and corrects his column of differences accordingly thus: —

Time.	Distance.	Differences.
Noon	77 2 11	.... 1 25 34
Three afternoon..	75 36 37	.... 1 45 22
Six	73 51 15	.... 1 45 8
Nine...............	72 6 7	.... 1 44 56
Midnight	70 21 11	.... 1 44 42
Three morning...	68 36 29	.... 1 44 27
Six.................	66 52 2	.... 1 44 13
Nine................	65 7 49	

On observing now his columns of differences he perceives, that in the six last lines, there is a gradual diminution of the preceding number by a small quantity between ten and twenty seconds only, but the difference between the two first numbers of his second column is nearly twenty minutes. This satisfies him, that there must be an errour in the distance stated in the Nautical Almanack at noon to be 77° 2′ 11″. For the first mode of correcting this errour he considers, what ought to have been the number in his column of differences instead of 1° 25′ 34″, which is evidently erroneous, and perceiving that the difference between the adjoining last numbers of this column does not exceed, in one instance only, fifteen seconds, and that it apparently is increasing, he assumes fourteen seconds as the difference between his two first numbers in the column of differences. By adding therefore fourteen seconds to his second number in this column, namely, 1° 45′ 22″, he obtains the number 1° 45′ 36″, for the first number in this column. Consequently, he corrects the distance at noon, by adding this number to the distance at three in the afternoon, namely, 75° 36′ 37″, and it gives him 77° 22′ 13″, for the distance of the Moon from the star at noon.

That this is not far from the truth is very certain, and if the French Connaissance were at hand the officer might try his table by that test: but in this instance he can derive no assistance from the French, as their tables do not give the Moon's distance from the star in question for this day. He has therefore nothing to depend upon but the Nautical Almanack; and, as he has the distances of the Moon from the star for the 1st of July, beginning at noon, if he could obtain the distances for the preceding hours in this day, he would have a farther guide for his correction. He will then naturally turn to the last day in June, and as astronomers make twenty-four hours in their day, if Aldebaran is mentioned on the last of June, he will obtain satisfactory information. On turning however to the distances of the Moon from stars on the 30th of June, he finds that Aldebaran is not mentioned on that day, and consequently he can depend only on the table before him, in which he will find sufficient reason to believe that he has made the proper correction. For he will observe, that in the erroneous distance, the errour laid in the minutes, and that in the unit place of these minutes his correction agrees with it. He may therefore be satisfied, that that figure is right; and as any other figure but 2, in the place of tens, could not possibly agree with the scale of differences, he will without fear make his distance for the 1st of July at noon 77° 22′ 11″. Should the next ship, that he hails, give him the list of errata to the Nautical Almanack, he will feel some satisfaction in finding, that his correction agrees with what the editers have made the true distance at noon of that day.

Thus we see, that we may come to a just conclusion by the mode, that I have laid down: and, as the Nautical Almanack affords instances in plenty, in which it may be similarly applied, the teachers of navigation may make their pupils correct in it, before they go to sea; and those that have the conduct of ships will feel confidence, after a few trials, on a subject, in which the lives and property of so many persons are at stake. We will now go to the observations on the heavenly bodies for this month.

The latitude of the Moon, on the 1st at midnight, is three degrees fifty-two minutes south, in the twentieth degree of the eighth sign (♏); and it decreases to the 11th, when she passes the ecliptick in her ascending node between twelve and one in the afternoon, in the second degree of the first sign; when her northern latitude increases, and becomes, on the 17th at midnight, five degrees fourteen minutes, in the second degree of the fourth sign (♋). It then decreases to the 25th, when she passes the ecliptick in her descending node between eleven and twelve in the morning, in the second degree of the seventh sign (♎); and it increases to the end of the month, being, on the last midnight, four degrees fifty-two minutes, in the twelfth degree of the ninth sign (♐).

The Moon rises about ten at night, on the 1st, under the first of the Balance, and is seen afterwards to be directing her course to Antares. On the 2d, she rises under the fourth and second of the Scorpion, and near to the former star. It will be seen during the morning of the 3d, that she will pass Antares about two hours after Moon-set.

On the 4th, the Moon rises in the morning at some distance from Antares, now to the west of her. On the 5th, she rises under (μ) the twelfth of the Archer to the east of her, directing her course under (λ), but she does not reach this latter star till after Moon-set. On the 6th, she rises under the small stars in the head of the Archer to the west of her; the two first stars of the Goat being visible at some distance to the east of her. On the 7th, she rises under the two first stars of the Goat to the east of her, and, from her great southern latitude, at some distance from them. On the 8th, she rises with the small stars in the tail of the Goat to the east of her, but does not reach them before Moon-set. On the 9th, she rises with the small stars in the tail of the Goat, now to the west of her; and on the 12th is new Moon, at fourteen minutes past eleven at night, but from her too great northern latitude without an eclipse.

On the 14th, the crescent of the Moon is seen about Sun-set in the west, and when the stars appear she will be seen near to the small stars in the tail of the Ram, near to (ζ) the sixth and above (δ) the fourth, Venus with the Pleiades forming a conspicuous object above her. On the 15th, she is seen with Venus at Sun-set in the middle, but on the confines of the lower region in the west, and with this planet, the Pleiades, Aldebaran, and the Hyades, forms afterwards a pleasing groupe in that quarter of the heavens. On the 16th, she is seen above Venus, and below the second of the Bull, directing her course near to the star, but not passing it till after Moon-set. On the 17th, she is between two groupes, Venus, the Pleiades, Aldebaran, with the Hyades below her, and Mars with the two first of the Twins above her. Above and near to her is (κ) the tenth of the Waggoner, which she soon passes. On the 18th, she is seen between (ε) the fifth and the first of the Twins, but nearest to the former star: she is evidently directing her course above Mars. On the 19th, she is first seen nearly in a line with the two first of the Twins, and of course nearest to the second, Mars being so near to her to the east, that she will evidently have passed him before her next appearance. On the 20th, she is seen above Mars, having below and near to her the two stars (δ and ε) with the included nebula of the Crab.

On the 21st, the Moon is on the meridian at nearly half past seven in the evening, being under the small stars in the head of the Lion, and nearest to (λ). Below her to the east, Regulus, and to the west, at a greater distance, Mars will command our attention. On the 22d, she is on the meridian at twelve minutes past eight, having below her to the west Regulus, as she passed this star at twenty minutes past two this afternoon. Almost directly above her is (γ) the third, and above that (ζ) the sixth of this constellation. Of course (η) the seventh will be distinguished below and to the west of (γ). On the 23d, she is on the meridian at fifty-two minutes past eight, having above her (θ) the eighth, and (δ) the fourth of the Lion, both near to the meridian to the east. On the 24th, she is on the meridian at about half past nine, having almost directly above her (β) the second of the Lion, surnamed Deneb ola, or tail of the Lion. Deneb being Arabic for tail. Between this star and her are the small stars in the head of the Virgin, and near to her to the east is the second of the Virgin.

On the 25th, the Moon is on the meridian at twelve minutes past ten at night, being under the five stars in triangle of the Virgin, (γ) the third being nearest to her to the east, and (η) the seventh to the west of her. She is directing her course to Spica, the first. On the 26th, she is on the meridian at fifty-two minutes past ten, having to the east of her the first of the Virgin, and her passage by this star, about three hours after, forms the principal feature in her course. On the 27th, she is on the meridian at thirty-seven minutes past eleven, having above her the tenth and eleventh of the Virgin to the east, and to the west of her, now at some distance, the first.

On the 28th is full Moon, at fifty-five minutes past nine in the morning, but with too great a southern latitude for an eclipse. At night she rises after Sun-set under the first of the Balance, and directs her course in the barren space of the southern scale to Antares. On the 29th, she rises with (β) the second of the Scorpion to the east of her, passing under (δ) the fourth soon after midnight, and directing her course to Antares. On the 30th, she rises soon after, near to, and to the east of Antares, as she passed this star at forty-eight minutes past three in the afternoon.

Mercury is in his inferior conjunction on the

12th, and before that day an evening star, from his favourable position to be discovered under the three first stars of the Ram on the 1st; and a few following days in west-by-north, as he is on the 1st an hour and a half above the horizon after Sun-set; but his height above the horizon rapidly diminishes. After the conjunction his position becomes unfavourable, both from the inclination of the ecliptick, and his southern latitude, and he will be seen by very few as a morning star. His latitude, on the 1st, is three degrees thirteen minutes north, in the twenty-eighth degree of the first sign (♈); and it decreases to the 20th, when he passes the ecliptick in his descending node, in the eighteenth degree of this sign. His southern latitude then increases to two degrees sixteen minutes, also in the same degree of this sign. He is twice stationary; on the 3d in the twenty-eighth, and on the 26th in the seventeenth degree, being thus retrograde from the 3d to the 26th, and afterwards moving with a direct motion. The Moon passes him on the 12th.

Venus is an evening star. Her latitude, on the 1st, is one degree twenty-five minutes north, in the twenty-second degree of the second sign

(♉); and it increases to about two degrees and three quarters, in the twenty-fifth degree of the third sign (♊), her motion being direct through about thirty-three degrees and a half. She is first seen above but near to the small stars in the tail of the Ram, and under the Pleiades. These latter stars she passes on the 6th, directing her course between the horns of the Bull, passing between (χ) the twenty-second and ($\varkappa$) the tenth of this constellation on the 13th, but nearest to the latter star. She passes above (τ) the nineteenth on the 17th, and is between the two stars in the tips of the horns on the 28th, being nearest to (β) the second, or star in the tip of the northern horn. The Moon passes her on the 16th.

Mars is an evening star, being on the meridian on the 10th about Sun-set, and every succeeding evening earlier. His northern latitude, on the 1st, is two degrees thirty-eight minutes north, in the twenty-fourth degree of the fourth sign (♋); and it decreases to about two degrees, in the sixth degree of the fifth sign (♌), his motion being direct through about twelve degrees. He is first seen in a line nearly with the two first of the Twins, and of course nearest to (β) the second. On the 11th, he passes above and near to (μ) the twelfth of the Crab; and he directs his course to the nebula in the Crab, finishing it just above and near to it, and a common telescope directed to him on the two last days will show his course by this nebula to advantage. The Moon passes him on the 20th.

Ceres is on the meridian at about half past seven at night on the 1st, and at about Sun-set on the 19th. Her latitude, on the 1st, is eleven degrees thirty-one minutes north, in the thirtieth degree of the fourth sign (♋); and on the 25th, ten degrees thirty-five minutes, in the fifth degree of the fifth sign (♌), her motion being direct through above six degrees and a quarter. The opportunities of tracing her path are still very favourable, though she is moving in a very barren space. At first, when on the meridian, the small stars (φ) in the Crab will be a direction to her, as the telescope directed above them will discover her, and she is directing her course to (ι) the tenth of the Crab, above and near to which she passes on the 20th, and she finishes her course between this star and the small stars called (ρ) the seventeenth of the Crab, but nearest to the latter star. The Moon passes her on the 20th.

Jupiter is a morning star. His latitude, on the 1st, is fifty-six minutes south, in the tenth degree of the twelfth sign (♓); and it increases about five minutes, his motion being direct through about six degrees. He is first seen under and near to (λ) the eleventh of the Water-bearer, the small star at the western margin of the stream from the Urn, and he finishes his course on the eastern margin, above and near to (φ), the twenty-second of this constellation. The unfavourableness of his position, and southern latitude, give him a height above the horizon of only about seven degrees at Sun-rise on the 1st, but this daily increases. The Moon passes him on the 10th.

Saturn is a morning star. His latitude, on the 1st, is two degrees nine minutes south, in the fifth degree of the first sign (♈); and it increases about three minutes, his motion being direct through about three degrees and a half. He is at first too near the Sun to be visible, and, from the unfavourableness of his position, he does not easily emerge from the influence of the solar rays; and at the end of the month he is only about six degrees above the horizon at Sun-rise. The Moon passes him on the 11th.

Herschel is on the meridian about half an hour before Sun-rise on the 1st, and about three in the morning on the 20th. His latitude, on the 1st, is ten minutes south, in the twenty-ninth degree of the ninth sign (♐); and it increases about a minute. He is stationary on the 10th, and his motion is afterwards retrograde through about a quarter of a degree, so that during the whole month he is seen in the same degree. When on the meridian, therefore, (μ) the twelfth of the Archer is a good direction to him, as it is above, to the east of, but near it, and at the distance of about two degrees and a half from him. The Moon passes him on the 5th.

The Sun's apparent diameter, on the 2d, is thirty-two minutes, and on the 20th, thirty-one minutes fifty-two seconds. The Moon's apparent diameter, on the 1st at midnight, is half a degree and thirty-eight minutes; and it increases to the 10th, on which day it is about thirty-two minutes fifty eight seconds. It then decreases to the 22d, when it is about twenty-nine minutes thirty-four seconds; and it afterwards increases to the end of the month, being on the last midnight, thirty-one minutes eighteen seconds. The Sun enters the second sign (♉) on the 20th, at three quarters past four in the morning.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
II.	6	48	6	22	5	53		
III.	8	37	8	11	7	42	7	13
IV.	10	58	10	32	10	3	9	34
V.	0	49	0	23	11	54	11	25
VI.	2	45	2	19	1	50	1	21
VII.	4	45	4	19	3	50	3	21
VIII.			6	24	5	55	5	26

MAY, 1820.

ENOUGH may appear to have been said in the preceding pages, on the errours in the Nautical Almanack, and the modes of correcting them, to put every one on his guard in his use of that valuable work, and to enable him to make his calculations with his accustomed confidence. But it is to be recollected, that the navy of Great Britain, the ships in the service of the East India Company, and many private vessels, have been accustomed to place such implicit reliance on this work, that their commanders would have thought it almost a dereliction of duty to make a correction in a single figure. They looked upon it as an infallible guide; and if from a lunar observation they were led to a result, that was palpably absurd, they would rather impute it to some want of attention in themselves than to an errour in the table.

Of this I was convinced by a conversation with a gentleman in the navy, to whom I pointed out the errours noticed last month in the distances of Aldebaran from the Moon. On my observing to him, that the distances, given on the 1st of July for Aldebaran from the Moon, at nine at night, and at midnight, pointed out so palpably the errour in one of them, that no one could be mistaken on this subject, he replied; "That he was by no means so clearly convinced as I seemed to be, that this would be the case. For," he said, "the officers in the navy work by certain rules, of which they have not all of them a theoretick knowledge. They pursue those rules implicitly; and it might happen that a conversation of this kind would take place between an inferiour and superiour officer. The inferiour officer would observe a most remarkable circumstance, that had not occurred to him before, that the Moon had appeared by the book to travel a little more than a quarter of a degree in three hours; and he could not account for such a singularity. The superiour officer would probably reply, that however difficult it might be for him to account for it, yet there could be no reason to doubt it. For there were great irregularities in the motion of the Moon, and it could not be imagined, that a work under the direction of the first men in the world, and published by authority, could make a mistake." Whether such a conversation might take place or not, the gentlemen of the navy, for whom no one entertains a greater respect than myself, must determine: but of this I am sure, that, if it might, it is no more than what has occurred to me in conversation with persons of some note in the learned professions.

I was one day in company with a divine of one of the sects, not established by law in this kingdom, who took a very considerable part in the formation and promotion of the Bible Society; when in expressing my hearty commendation of the zeal, by which it was evidently guided, I lamented, that it did not act up to its profession of distributing Bibles without note or comment; and that with such funds at its disposal, it did not take some pains to make the Bibles distributed more conformable to the original. He replied, that it was after great deliberation the Bible, according to the version made by authority of James the First, was adopted; and that there would have been great danger of unsettling people's minds, if they had taken upon themselves to correct it I answered, that by so doing they lost the opportunity of correcting those mistakes, of which the infidels availed themselves in their arguments against the truth of our holy religion. For example, when it is said, that a prophet addressed the Supreme Being in these terms: "O Lord, thou hast deceived me, and I was deceived;" can it be supposed that language, which would not be tolerated between man and man, could have been used by a prophet to his Maker? The divine was by no means convinced, that the language was improper; and he was sure, that it was justified by learned commentaters, who took the words given in the common translation as correct. It was in vain that I observed, that if the prophet had really used such an expression, he must according to the Jewish law have been stoned to death, and that in the Hebrew the language was the direct reverse. As he did not understand Hebrew* (and this is no extraordinary case in numbers, who set themselves up for learned men, and are men of note in their respective sects) it was of little avail to make use of the latter argument. It was sufficient, that the vulgar version read the passage as I have quoted it, and therefore it must be right. Unbelievers have however brought it forward lately with no small advantage to their cause: but I was glad to see, that, in the last translation by authority from Geneva, the verse has been rendered more in conformity with the original. *Tu m'as attiré, O Eternel! et je t'ai suivi.* "Thou hast drawn me to thee, O Lord, and I have followed thee."

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* μήτι δύναται τυφλὸς τυφλὸν ὁδηγειν; οὐχὶ ἀμφότεροι εἰς βόθυνον πεσοῦνται;

It may be said here, what are the unlearned to do, when they meet with similar passages. They must depend on the vulgar translation, for they have no other, and so must the sailer on his Nautical Almanack, when he has no other to correct it by: but still he has in the Nautical Almanack itself, as I have shown, the means of correcting its errours, and so has the unlearned Christian from the Bible itself sufficient means, if he chooses to use them, to prevent himself from being led astray by any impropriety in the common translation. If any thing occurs, which is directly contrary to the general character of the speaker, common sense will point out, that he could not have used the language attributed to him, in the sense it bears in the English language. For example, who will believe, on a little consideration, that our Saviour called the two disciples walking with him to Emmaus fools; or that Paul, who so strongly inculcates courtesy in our conversation with each other, and with men of a different persuasion, should use the term fool to his opponent in argument; or, in addressing the most polite and learned audience in the world, and whose favourable hearing it was not only his intention, but evidently his interest to conciliate, should begin his oration by what must disgust every man in the assembly? "Ye men of Athens, I perceive that in all things ye are too superstitious." With what contempt must not the members of the Areopagus have looked upon such a speaker; and is it likely that they would have attended with patience to the end of his harangue?

Upon this and on similar occasions, the rule I have laid down for the proper perusal of the Scriptures is as infallible, as that for correcting the errours in the Nautical Almanack. We have nothing to do but to consider the general scope of our holy religion, and the characters of the holy men, whose actions or speeches are recorded in them, and we may be persuaded, that if inconsistencies in certain cases appear, they are not really so in the original; not but that it would be much better to correct these mistakes, when they are pointed out, and thus take away from the unbeliever those arguments, which he unhappily uses with so much force against himself and against the truth. If one man only were thus saved from the errour of his ways, I am sure, that it would be much more for the honour of the Christian religion, than if all its opponents were thrown into prison for reviling it, or holding it in contempt, or blaspheming it. But we proceed to the contemplation of the heavens for this month.

The Moon's latitude, on the 1st at noon, is five degrees nine minutes, in the third degree of the tenth sign (♑); and it then decreases to the 8th, when she passes the ecliptick in her ascending node between seven and eight in the afternoon, in the first degree of the first sign. Her northern latitude now increases to the 15th, when it is, at noon, nearly five degrees six minutes, in the fourth degree of the fourth sign

(♋); and it decreases afterwards to the 22d, when she passes the ecliptick in her descending node between four and five in the afternoon, in the last degree of the twelfth sign (♓). Her southern latitude then increases to the 29th, when it is, at noon, five degrees two minutes, in the twenty-ninth degree of the ninth sign (♐).

The Moon rises, on the 1st, about twenty minutes before midnight, under Herschel and the twelfth of the Archer to the east of her; and during the morning of the 2d is seen to direct her course above (γ) the third of this constellation, which she passes about Sun-rise.

On the 3d, the Moon rises in the morning under the small stars in the head of the Archer, passing soon under and near to (σ) the small star in the shoulder. On the 4th, she rises in the barren space between the Archer and the Goat, having above her the small stars in the head of the former constellation to the west, and the two first stars of the Goat to the east. On the 5th, the two first stars of the Goat are at her rising above her to the west, and from her great southern latitude at some distance from her. On the 6th, she rises with the small stars in the tail of the Goat to the west of her. On the 7th, she rises nearly with Jupiter to the east of her, to whom she is directing her course. On the 8th, she rises soon after Jupiter, now to the west of her, directing her course to Saturn. On the 9th, she rises nearly with Saturn, above whom she is directing her course, but she does not reach him before Sun-rise; and on the 12th is new Moon, at nine minutes past nine in the morning, but with too great a northern latitude for an eclipse.

On the 13th, the crescent of the Moon will be seen about Sun-set in the west-north-west, her favourable position and northern latitude giving her a height of above fifteen degrees at Sun-set; above her is the second of the Bull and Venus, and she is directing her course to the star. On the 14th, she is seen above (β) the second of the Bull, having passed this star about a quarter before one in the afternoon; to the east of her is Venus, above whom she passes about four hours after Moon-set. On the 15th, she is seen above Venus, and under the two first of the Twins, directing her course to (β); under and nearest to her is (ε) the fifth of this constellation. On the 16th, she is seen to have travelled slowly from Venus, being now under and near to (β) the second of the Twins, passing this star at twenty-three minutes past nine, Mars being at some distance from her to the east. On the 17th, the two small stars and included nebula of the Crab are midway between her and Mars, but she does not pass above these stars till after midnight. On the 18th, she is seen under the small stars of the Lion, between Mars and (λ) the eleventh, but nearest to the star. On the 19th, she is seen to have travelled slowly from Mars, being now nearly midway between Regulus and (η) the seventh of the Lion. On the 20th, she is under (θ) the eighth, (δ) the fourth, and (β) the second, of the Lion, but nearest to the former star, and she directs her course to the second of the Virgin. On the 21st, she is seen under the small stars in the head of the Virgin, and will evidently pass (β) the second, before her next appearance.

On the 22d, the Moon is on the meridian at nine minutes past eight in the evening, having to the east of her (η) the seventh, and to the west of her (β) the second of the Virgin; and she is seen to pass under (η), directing her course to Spica. On the 23d, she is on the meridian at forty-nine minutes past eight. Spica, the first of the Virgin, being below her to the east, and she will have passed this star before her next appearance. On the 24th, she is on the meridian at thirty-two minutes past nine, being about midway between Spica to the west, and the tenth and eleventh of the Virgin to the east of her. On the 25th, she is on the meridian at seventeen minutes past ten, having above her to the east the first of the Balance, and at a greater distance to the west the eleventh and tenth of the Virgin, and she directs her course to Antares. On the 26th, she is on the meridian at seven minutes past eleven, having above her to the east the second of the Scorpion, and to the west the two first of the Balance, the second of this latter constellation being near to the meridian. She is directing her course to Antares, between (δ) the fourth and (π) the sixteenth of the Scorpion.

On the 27th is full Moon, at forty-nine minutes past nine at night, but from her great southern latitude without an eclipse. She rises under the second of the Scorpion, and is soon followed by Antares, as she passes near to but under this latter star at eighteen minutes past eleven. On the 28th, she rises under (θ) the eighth of the Serpent-bearer. On the 29th, she rises with the small stars in the head of the Archer, and under (λ) the eleventh of this constellation. On the 30th, she rises under the small stars in the head of the Archer to the west, and the two first of the Goat to the east of her, but nearest to the former star; and on the 31st, under the two first of the Goat, but from her too great southern latitude at some distance from them.

Mercury is a morning star, at his greatest elongation on the 10th. His latitude, on the 1st, is two degrees twenty-six minutes south, in the eighteenth degree of the first sign (♈); and it decreases to one degree thirty-two minutes, in the twenty-fourth degree of the second sign (♉), his motion being direct through about thirty-six degrees. The unfavourableness of his position, and southern latitude, will keep him invisible to the general observer. On his day of greatest elongation he is only about five degrees above the horizon in the east at Sun-rise, and this is daily decreasing. The Moon passes him on the 10th.

Venus is an evening star, at her greatest elongation on the 20th. Her latitude, on the 1st, is two degrees forty-eight minutes north, in the twenty-sixth degree of the third sign (♊), and it increases to three degrees, in the eighth degree of the fourth sign (♋), on the 13th. It then decreases to about two degrees and three quarters, in the twenty-fourth degree of this latter sign, her motion being direct through about thirty degrees. She is first seen at the head of the constellation of the Bull, above the sixth, or tip of the southern horn; and she passes between (κ) the tenth of the Waggoner and (η) the seventh of the Twins on the 6th, but nearest to the former star. She directs her course above (ε) the fifth of the Twins, within a degree from which star she passes on the 12th. On the 26th, she passes the second of the Twins, and directs her course to the nebula in the Crab, stopping short of (μ) the twelfth of this constellation, being then nearly in a line with the two first of the Twins. The Moon passes her on the 16th.

Mars is an evening star. His latitude, on the 1st, is one degree fifty-eight minutes north, in the sixth degree of the fifth sign (♌); and it decreases to about a degree and a half, in the twentieth degree of this sign, his motion being direct through about fifteen degrees and a half. He is first seen above and near to the nebula in the Crab, and he directs his course through the barren space between the Crab and the Lion to Regulus, passing under (λ) the eleventh of this constellation on the 21st, and above (ξ) the fourteenth on the 27th. He stops short of Regulus, but will evidently pass him next month. The Moon passes Mars on the 18th.

Ceres is an evening star. Her latitude, on the 1st, is ten degrees twenty-two minutes north, in the sixth degree of the fifth sign (♌), and nine degrees thirty-six minutes north on the 25th, in the fourteenth degree of this sign, her motion being direct through about ten degrees. She is first seen under the foot of the Lynx, above and near to the small stars (ρρ) of the Crab; and Mars passes her on this day, at the distance of about eight degrees and a half. She is directing her course to the small stars in the head of the Lion, passing under (κ) the tenth, the most western of them, on the 22d; and she finishes her course above (λ) the eleventh of this constellation. The Moon passes her on the 18th.

Jupiter is a morning star. His latitude, on the 1st, is about a degree south, in the sixteenth degree of the twelfth sign (♓); and it increases to nearly one degree eight minutes, his motion being direct through about four degrees and three quarters. He is first seen on the eastern margin of the stream from the Urn, about a degree east from (φ) the twenty-second of the Water-bearer; and his course is in the barren space under the four stars in square. The Moon passes him on the 7th.

Saturn is a morning star. His latitude, on the 1st, is two degrees twelve minutes south, in the ninth degree of the first sign (♈); and it increases about five minutes, his motion being direct through about three degrees. From the unfavourableness of his position, and southern latitude, he is only about six degrees above the horizon in the east, at Sun-rise on the 1st, but this height is daily increasing. He is moving in a barren space, and finishes his course under (δ) the fourth of the Fishes, about four degrees from it. The Moon passes him on the 9th.

Herschel is on the meridian at seventeen minutes past three in the morning of the 1st, and at two on the 18th. His latitude, on the 1st, is eleven minutes south, in the twenty-ninth degree of the ninth sign (♐); and it continues nearly the same the whole month, his motion being retrograde through about a degree. He will therefore, when on the meridian, be almost directly over (γ) the third of the Archer, having (μ) the twelfth above him to the east, and being nearest to this latter star. The Moon passes him on the 2d, and on the 29th.

The Sun's apparent diameter on the 4th, is thirty-one minutes forty-six seconds, and on the 25th, thirty-one minutes, thirty-seven seconds. The Moon's apparent diameter, on the 1st at midnight, is thirty-one minutes thirty-four seconds; and it increases to the 8th, being, on the 7th and 8th, about thirty-two minutes and a half. It then decreases to the 20th, during which day it is about twenty-nine minutes thirty-six seconds; and then increases to the end of the month, being, on the last midnight, thirty-two minutes twenty seconds. The Sun enters the third sign (♊) on the 21st, at seven minutes past five in the morning.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table :—

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
IV.	9	7	8	40				
V.	10	58	10	31	10	0	9	28
VI.	0	54	0	27	11	56	11	24
VII.	2	54	2	27	1	56	1	24
VIII.	4	59	4	32	4	1	3	29
IX.					6	4	5	32

JUNE, 1820.

THAT man is liable to errour is a position often laid down in books, though little attended to in the practice of life. The experience of every one must however convince him of the truth of this maxim; and when we see it verified in works of calculation, where detection is easy, we must not wonder, if nations as well as individuals should err: nay, that they should live through centuries under the same errour, and be so obstinately attached to it, that they who would set them right have, we might almost say, constantly fallen victims to their endeavours to promote the cause of truth. "Which of the prophets sent to you by my Father," said our Saviour to the unbelieving Jews, "have ye not reviled and persecuted?" And in philosophy it has been as difficult to remove prejudices. Copernicus died before he could be brought to an account for his opinions; but his disciple Galileo is an humiliating instance of the difficulties, which truth has to encounter. The *amende honorable*, which he was compelled to make before a wicked and ignorant tribunal, has not prevented his opinions from gaining ground; and in the present day the philosopher is the object of our admiration and respect, whilst the names of his persecutors are scarcely known, and their dogmas are held in the utmost contempt.

The base and degenerate nation, in which he suffered this degradation, has a proverb, which is cried up by the profligate in this world as a masterpiece of wisdom. *Il volto sciolto, ed i pensieri stretti.* Think with the wise, but talk as the vulgar: *i. e.*, do not be led away yourself by the false opinions entertained by those around you, but do not expose yourself to any danger by an attempt to correct them. The consequence of that opinion has been, as I am very credibly informed, that the higher classes in general in that country are Deists; and the lower classes are dupes to the most abject superstition. How much superior are the maxims of Christianity, which teaches, that the Gospel was first proclaimed to the poor and by the poor; that nothing relative to it is to be kept secret from them, that every Christian is to be ready and willing to give an answer, with meekness, for the faith that is in him; and that the belief of the divine mission of our Saviour will be mainly upheld in the world, by the conduct of Christians to each other, and to those of a different persuasion.

It was the opinion of philosophers of a former age, that the Earth was the centre of our system, and immoveable, and that the heavens, a solid firmament, revolved around it. This was the philosophy of Egypt, at a time, when it was distinguished for literature, patronised in a very eminent degree by the Ptolemies. In the reign of one of them, a translation into Greek of the Hebrew Pentateuch was executed; and no one, who knows the difficulty of transfusing into one language the sentiments conveyed by another, will be surprised, if in some places the meaning of the original has been mistaken. An instance of this kind occurs in the first chapter of Genesis, where a word was translated by the Greeks into one, which conveys an idea of solidity*. When the Christian Religion had made some progress in the Roman Empire, a translation was undertaken into the Latin language of the Scriptures; but I suspect, that it was made from the Greek, with little or no attention to the Hebrew, with which probably the translaters were not much acquainted. The consequence was, they naturally gave the sense of solidity to the word in the Greek, and by translating it *firmamentum*, or firmament, conveyed an idea which corresponded with the philosophy of the times, and made Moses speak according to their notions. From this false translation the word firmament came into the English versions of the Scriptures, and into those of the nations of Europe; and upon this mistaken word is founded an argument against the authority of the Pentateuch.

The Deist says: "You represent the Supreme as forming a firmament. Now philosophy has taught us, that no such thing exists: but, as far as the penetrating power of the Herschelian telescope extends, there is space, occupied at intervals by innumerable luminous bodies. Consequently Moses was misinformed on this subject, and his narration is undeserving of credit." Now, if we had only the Latin and Greek Scriptures to refer to it would be difficult to answer this argument: but, happily for mankind, the Jews have preserved their Scriptures, and maintained the character for which the apostle has held them out to us as deserving of our highest respect and regard*. What have we to do then but to refer to their Scriptures, and there we find, that this word, which has given so plausible an argument to the Deist, does not convey at all the idea of solidity, but expresses, by the properest term, the manner in which the atmosphere is expanded round the Earth. Thus there is an end at once of the dispute: and in the same manner a variety of difficulties might be solved, provided there was sufficient candour in the professing Christians and their antagonists to apply to the proper source, instead of abusing each other.

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* *Στερεωμα.*

These parties fall into a common mistake in supposing, that Moses gave us the inestimable history of the creation, that we might have proper philosophical notions of the formation of this Earth. But he had far nobler ends in view; and though I am persuaded, that his account, philosophically considered, is strictly true, and far superior to any other account that has ever appeared in the world, yet our instruction in the material processes recorded by him is of little consequence, compared with the great lesson taught in this chapter to his people; and which, in fact, if always attended to, would have preserved them from the abominations, which crept in amongst them, from their depravity in imitating the corruptions of other nations. The established religions of by far the greater part of the world in the time of Moses worshipped not only several persons as God, but fell down before the images of various creatures, and paid that homage, which is due to the Creater only, emphatically styled in our Christian Scriptures, " Our Heavenly Father," to the works of his almighty power, particularly the Sun and the Moon.

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* Rom. iii, 1, 2.

Against this prevailing errour the first chapter of Genesis was a complete antidote: for it taught the chosen people of God, that the Sun, so far from being the author of light, was itself a passive instrument, by which light, an element independent of it, is in the day time most powerfully diffused over that part of the globe, which is exposed to its rays, impelled in a manner unknown to us from this magnificent orb. An Israelite, knowing that light was the first element disengaged from the chaotick mass, and that it existed independent of the Sun, could not fall prostrate, as his neighbours did, before senseless matter; and whatever benefit he received from its beams, he referred the whole not to the creature but to the Creater, who is over all, blessed for ever.

The Deist makes a mighty stir about the light being produced before the appearance of the Sun: but one would think, that every night, when his candles are brought in, he would have a convincing argument before him, that light exists independent of the Sun. In the same manner the most specious arguments of Deism are with equal facility refuted. They appear of consequence to those only, who have more of Christianity in their mouths than in their hearts: and the ark of God can never require the hand of an Uzzah to support it. But we will now proceed to the contemplation of the heavens for this month.

The Moon's latitude, on the 1st at midnight, is nearly three degrees twenty minutes south, in the eighteenth degree of the eleventh sign (♒); and it decreases to the 4th, when she passes the ecliptick in her ascending node, between nine and ten at night, in the twenty-ninth degree of the twelfth sign (♓). Her northern latitude then increases to the 11th, being at noon on that day a little more than five degrees, in the twenty-ninth degree of the third sign (♊); decreasing afterwards to the 18th, on which day she passes the ecliptick in her descending node, between seven and eight at night, in the twenty-eighth degree of the sixth sign (♍). Her southern latitude increases to the 25th, being at noon on that day a little more than five degrees, in the twenty-fourth degree of the ninth sign (♐); and then decreases to the end of the month, passing the ecliptick in her ascending node between ten and eleven at night, in the twenty-seventh degree of the twelfth sign (♓).

The Moon rises, on the 2d in the morning, with the four small stars in the tail of the Goat, and is seen to pass between the two highest and the two lowest. On the 3d, she rises under the eighth of the Water-bearer, directing her course to Jupiter. On the 4th, she rises nearly with Jupiter, to whom she is observed to make rapid approaches, but she does not pass him till seventeen minutes past eight this morning. On the 5th, she rises nearly in a line with the two eastern of the four stars in square, Jupiter being now to the west of her, and she is soon followed by Saturn to the east of her, whom she will have passed before her next appearance. On the 6th, she rises with Saturn, now to the west of her, and her recess from this planet is the chief feature of her course. On the 7th, she rises under the three first stars of the Ram, to the east of her, and of course being nearest to (γ) the third of this constellation. Saturn is now at some distance from her to the west, and Jupiter as far again. On the 8th, she rises under the three first stars of the Ram, now to the west of her; and on the 10th is new Moon, at forty minutes past seven in the evening, but from her too great northern latitude without an eclipse.

On the 12th, the crescent of the Moon is seen about Sun-set in west-north-west, and when the stars appear the two first of the Twins are seen above her, but she does not pass the second till after Moon-set: Venus and Mars above her at some distance will attract attention. On the 13th, she is seen under the two small stars and included nebula of the Crab, near to but to the east of which stars is Venus, whom she will have passed before her next appearance. On the 14th, she is seen under the small stars in the head of the Lion, between Venus and (λ) the eleventh of this constellation, directing her course to Regulus and Mars. On the 15th, she is seen under (η) the seventh of the Lion, and above Regulus, both to the east of her, Mars being to the east of them, and she will evidently have passed above the latter star and the planet before her next appearance. On the 16th, she is seen above Mars, as she passed near to him at twenty-seven minutes past nine this morning. On the 17th, she is seen to have receded considerably from Mars, and to be directing her course to (β) the second of the Virgin. On the 18th, she is midway between (β) the second and (η) the seventh of the Virgin, the former to the west, the latter to the east of her. On the 19th, she is between (γ) the third and Spica, but nearest to the former star, and directing her course to the latter. On the 20th, she is seen near to Spica, but to the east of this star, as she passed it at fifty minutes past six this evening.

On the 21st, the Moon is on the meridian about Sun-set, having above her the tenth and eleventh of the Virgin, and she will be seen to pass under (λ). On the 22d, she is on the meridian at fifty-one minutes past eight, being under the two first of the Balance, (α) being to the west of her, and (β) almost directly above her. On the 23d, she is on the meridian at forty-four minutes past nine, having (δ) the fourth of the Scorpion almost directly above her, and (β) the second higher up to the east and near to the meridian; (π) the sixteenth is near to her to the west, and she will soon pass it in her way to Antares, which star she does not reach till after Moon-set. On the 24th, she is on the meridian at forty-one minutes past ten, having now Antares to the west of her, as she passed this star at about a quarter past eight this morning, having moved from it with considerable rapidity. On the 25th, she is on the meridian at forty-two minutes past eleven, having below and near to her to the west (γ) the third of the

Archer, and to the east (δ) the fourth, above and near to which latter star she will soon pass, (μ) the twelfth being, from her great southern latitude, at some distance above her.

On the 26th is full Moon, at four minutes past seven in the morning, but from her great southern latitude without an eclipse. She rises, in the evening, under the small stars in the head of the Archer. On the 27th, she rises under the two first stars of the Goat to the east of her; and on the 28th they are above and to the west of her, and she will be seen to direct her course to the small stars in the tail of this constellation. On the 29th, she rises with the small stars in the tail of the Goat to the west of her; and on the 30th, she rises under the four stars in triangle of the Urn, being about midway in its stream between (λ) and (φ).

Mercury is in his superior conjunction on the 15th, but too near the Sun to be discovered by the general observer before that time. His position is more favourable at the end of the month, when he is an evening star; but then his height above the horizon at Sun-set is not nine degrees, to the west of west-north-west. His latitude, on near to the latter star on the 7th. She then directs her course to (γ) the third of the Lion, which she passes about the end of the month. A telescope directed between (ε) and (γ) will be sure to find her from the 7th. The Moon passes her on the 15th.

Jupiter is a morning star. His latitude, on the 1st, is one degree eight minutes south, in the twenty-first degree of the twelfth sign (♓); and it increases to about a degree and a quarter, his motion being direct through about two degrees and a half. He is seen therefore, during the whole month, near the same spot, in the barren space under the four stars in square, about midway between the lines drawn through the two eastern and two western stars and produced. The Moon passes him on the 4th.

Saturn is a morning star. His latitude, on the 1st, is two degrees seventeen minutes south, in the twelfth degree of the first sign (♈); and it increases about eight minutes, his motion being direct through about a degree and three quarters. He is seen therefore near the same spot, under (δ) the fourth of the Fishes, and almost in a line with the highest and lowest of the four stars in square. The Moon passes him on the 5th.

Herschel is on the meridian about one in the morning on the 3d, and at three quarters past eleven at night on the 21st. His latitude, on the 1st, is eleven minutes south, in the twenty-eighth degree of the ninth sign (♐); and it increases about a minute, his motion being retrograde through nearly a degree and a quarter. He is, when on the meridian, seen at first directly above (γ) the third of the Archer, slowly receding to the western margin of the Milky-way. The Moon passes him on the 25th.

The apparent diameter of the Sun, on the 1st, is thirty-one minutes thirty-five seconds; and on the 16th thirty-one minutes thirty-two seconds. The Moon's apparent diameter, on the 1st and 2d, is about thirty-two minutes twenty-two seconds; and it then decreases to the 17th, being, on that and the preceding day, about twenty-nine minutes thirty-six seconds. It then increases to the 29th, being, at noon on that day, thirty-two minutes forty-six seconds. The Sun enters the fourth sign (♋) on the 21st, at forty-three minutes past one in the afternoon.

near to the latter star on the 7th. She then directs her course to (γ) the third of the Lion, which she passes about the end of the month. A telescope directed between (ε) and (γ) will be sure to find her from the 7th. The Moon passes her on the 15th.

Jupiter is a morning star. His latitude, on the 1st, is one degree eight minutes south, in the twenty-first degree of the twelfth sign (♓); and it increases to about a degree and a quarter, his motion being direct through about two degrees and a half. He is seen therefore, during the whole month, near the same spot, in the barren space under the four stars in square, about midway between the lines drawn through the two eastern and two western stars and produced. The Moon passes him on the 4th.

Saturn is a morning star. His latitude, on the 1st, is two degrees seventeen minutes south, in the twelfth degree of the first sign (♈); and it increases about eight minutes, his motion being direct through about a degree and three quarters. He is seen therefore near the same spot, under (δ) the fourth of the Fishes, and almost in a line with the highest and lowest of the four stars in square. The Moon passes him on the 5th.

Herschel is on the meridian about one in the morning on the 3d, and at three quarters past eleven at night on the 21st. His latitude, on the 1st, is eleven minutes south, in the twenty-eighth degree of the ninth sign (♐); and it increases about a minute, his motion being retrograde through nearly a degree and a quarter. He is, when on the meridian, seen at first directly above (γ) the third of the Archer, slowly receding to the western margin of the Milky-way. The Moon passes him on the 25th.

The apparent diameter of the Sun, on the 1st, is thirty-one minutes thirty-five seconds; and on the 16th thirty-one minutes thirty-two seconds. The Moon's apparent diameter, on the 1st and 2d, is about thirty-two minutes twenty-two seconds; and it then decreases to the 17th, being, on that and the preceding day, about twenty-nine minutes thirty-six seconds. It then increases to the 29th, being, at noon on that day, thirty-two minutes forty-six seconds. The Sun enters the fourth sign (♋) on the 21st, at forty-three minutes past one in the afternoon.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		15		23	
	h.	m.	h.	m.	h.	m.	h.	m.
V.	8	55	8	26	7	57		
VI.	10	51	10	22	9	53	9	20
VII.	0	51	0	22	11	53	11	20
VIII.	2	56	2	27	1	58	1	25
IX.	4	59	4	30	4	1	3	28
X.			6	25	5	56	5	23

JULY, 1820.

THE appearance of the comet last year, without any warning from astronomers, the shortness of its stay with us, and the prejudices, which still subsist, respecting these bodies, made it for a time the general subject of conversation. "Where were the astronomers," it was said, "that they knew nothing of the matter; and why did they leave it to the guard of a mail coach to announce to the country the arrival of this stranger?" Among those, by whom these questions were frequently repeated, it fell to my lot to be remarked upon by a lady, for whom I entertain very great respect, who looked in vain to my book for 1819, for some intelligence concerning this wonderful stranger. "Why was it not announced in the EVENING AMUSEMENTS?" The answer is very short: "Because the Author knew nothing of the matter." On the doctrine of comets he is a very great sceptick; and he is they may be written, taking care only, that they should be authentick, and important. I shall hope, that the lady I have above alluded to will send her card; and I trust, that her ladyship's connections, in the line marked out in the map annexed to the memoir, will be excited by her not to let this phœnomenon pass unnoticed, and also be prepared to attend to those circumstances, which are so judiciously pointed out by Mr. Baily as the most worthy of notice. It is not from great observatories only, that we are to expect information. A combination of observations from persons in different parts, following the plain and simple directions of Mr. Baily, may serve the cause of astronomy in a higher degree than those, which can be expected from a few observatories only: and I am persuaded, that the author of the memoir will not be offended at my borrowing largely from it, and thus co-operating with him in his laudable endeavour to make this phœnomenon more particularly noticed than any of the same kind, that has hitherto come under the observation of mortals.

There has not been so great an eclipse observed in this part of Europe since the year 1764, nor will there be another equal to it before to my readers the arrival of a comet, I have some pleasure in calling their attention to a phœnomenon, which is more interesting to astronomy, and of rarer occurrence, than that of some one or other of the innumerable wandering bodies, whose appearance, not being reduced to certain rules, is in general the subject of greater admiration. We have this year four eclipses, and one of them, an annular eclipse of the Sun, will happen on the 7th of September. We shall not in this island have the advantage of seeing it in this particular and beautiful form; but it will be so seen in a long line of country, from the German Ocean to the Adriatick, and through the south of Italy. We are greatly indebted to a gentleman of Gray's Inn, Mr. Francis Baily, for calling the attention of the publick to this subject; and he has not only printed a very interesting memoir upon it, not intended for sale, but has declared his readiness to furnish such persons, as may send their cards for that purpose, with any number of copies they may require. He has annexed a request, which I trust will be generally complied with, that they, who thus receive his memoir, will be kind enough in return to favour him with the observations, they or their friends may make, in whatever language they may be written, taking care only, that they should be authentick, and important. I shall hope, that the lady I have above alluded to will send her card; and I trust, that her ladyship's connections, in the line marked out in the map annexed to the memoir, will be excited by her not to let this phœnomenon pass unnoticed, and also be prepared to attend to those circumstances, which are so judiciously pointed out by Mr. Baily as the most worthy of notice. It is not from great observatories only, that we are to expect information. A combination of observations from persons in different parts, following the plain and simple directions of Mr. Baily, may serve the cause of astronomy in a higher degree than those, which can be expected from a few observatories only: and I am persuaded, that the author of the memoir will not be offended at my borrowing largely from it, and thus cooperating with him in his laudable endeavour to make this phœnomenon more particularly noticed than any of the same kind, that has hitherto come under the observation of mortals.

There has not been so great an eclipse observed in this part of Europe since the year 1764, nor will there be another equal to it before the year 1847. Now, if we take the interval between these two years, amounting to upwards of eighty years, and consider how many comets have been seen since the year 1764, and how many more will probably be seen before the year 1847, we cannot but look on the eclipse in the present year as an object of as great curiosity as that of the appearance of a comet. It falls to the lot of very few persons, comparatively speaking, to be favoured with the sight of either an annular or a total eclipse of the Sun. Myriads upon myriads are agitated with vain terrours on the appearance of comets; but the last comet had nothing to do with the melancholy event on the 16th of August in this country; nor will this annular eclipse of the Sun accelerate or retard the measures in agitation to raise or depress the people; to enlarge or contract the limits of free enquiry; to make the press the instrument of increasing knowledge blasphemy, or a tool subservient to the views of tyranny treason and priestcraft sedition. The appearances in the heavens for this month call us now to different speculations.

The Moon passes the ecliptick in her ascending node, on the 1st, between ten and eleven at night, in the twenty-seventh degree of the twelfth sign (♓); and her northern latitude increases to the 8th, when it is, at noon, five degrees two minutes, in the twenty-fifth degree of the third sign (♊); and it decreases then to the 15th, when she passes the ecliptick in her descending node, between nine and ten at night, in the twenty-sixth degree of the sixth sign (♍). Her southern latitude then increases to the 22d, being, at midnight, five degrees six minutes, in the twenty-fifth degree of the ninth sign (♐); and it decreases afterwards to the 29th, when she passes the ecliptick in her ascending node, between one and two in the morning, in the twenty-fifth degree of the twelfth sign (♓); and her northern latitude then increases, being, on the last midnight, three degrees twenty-six minutes, in the sixth degree of the second sign (♉).

The Moon rises, on the 1st, soon after eleven at night, about the same time with and near to Jupiter, as she passed the planet at twenty-one minutes past five this afternoon. She is seen afterwards to be directing her course above Saturn to the east of her. On the 2d, she is followed soon after her rising by Saturn, but she does not pass him till after Sun-rise. On the 3d, she rises soon after Saturn, now to the west of her, and during their visible appearance in the morning of the 4th, is seen to recede from him at a considerable rate, directing her course to the Pleiades.

On the 5th, the Moon rises in the morning under the three first stars of the Ram, and on the 6th, about the same time with the Pleiades to the east of her, but she does not reach them till after Sun-rise. On the 7th, she rises soon after the Pleiades, now to the west of her, and is seen afterwards to direct her course to (β) the second of the Bull. On the 8th, she rises under and near to the second of the Bull, and she passes this star about Sun-rise.

On the 10th is new Moon, at thirty-six minutes past seven in the morning, but from her great northern latitude without an eclipse. On the 11th, her crescent is seen near the horizon soon after Sun-set, to the north of west-north-west, Venus, whom she will have passed before her next appearance, being in the west-north-west, and nearer to the horizon. On the 12th, she is seen between the small stars in the head of the Lion and Regulus, directing her course to Mars to the east of the star, Venus being now below her to the west. On the 13th, she is seen above Regulus, approaching Mars at a very slow rate. On the 14th, she is still, from the slowness of her motion, to the west of Mars, but she will have passed near to him before her next appearance. On the 15th, she is seen to the east of Mars, and near to (β) the second of the Virgin, under and near to which star she passes before Moon-set, Mars being now at some distance to the west of her. On the 16th, she is under (η) the seventh and (γ) the third of the Virgin, the former to the west, the latter to the east of her, her motion being now remarkably slow, as will be observed by her nearness to Mars, considering the time that has elapsed since she passed him. She is directing her course to the first of the Virgin. On the 17th, she is seen still to the west of Spica, passing this star about four hours and a half after Moon-set, and she is moving now at a greater rate than for the few days last past. On the 18th, she is seen under the tenth and eleventh of the Virgin. On the 19th, she is seen passing under the first of the Balance. On the 20th, she is seen under the second and fourth of the

Scorpion to the east of her, directing her course to Antares.

On the 21st, the Moon is on the meridian at twenty-one minutes past eight at night, under and near to Antares to the west of her, as she passed this star at three quarters past five this afternoon. On the 22d, she is on the meridian at twenty minutes past nine, being now removed to some distance from Antares to the west of her. On the 23d, she is on the meridian at twenty-three minutes past ten, having the small stars in the head of the Archer above her to the east, and (λ), the eleventh of this constellation, above and much nearer to her to the west. On the 24th, she is on the meridian at twenty-six minutes past eleven, having above her, to the west, the small stars in the head of the Archer, and to the east, at a greater distance, the two first stars of the Goat.

On the 25th is full Moon, at fifty-three minutes past two in the afternoon, but from her great southern latitude without an eclipse. In the evening she rises at some distance under the two first stars of the Goat to the west of her, and she is moving at a very great rate towards the small stars in the tail of this constellation. On the 26th, she rises with the small stars in the tail of the Goat, having just passed the most eastern of them. She is soon followed by Jupiter, considerably to the east of her. On the 27th, she rises under the four stars in triangle of the Urn, about the same time with Jupiter, to whom she directs her course. On the 28th, she is seen soon after her rising to the east of Jupiter, and she passes above this planet soon after midnight, and her transit by him is the chief feature of her course, in otherwise a very dreary region, and she directs her course above Saturn. On the 29th, she rises to the west of Jupiter, from her rapid motion at some distance from her, and it will be evident that she will have passed Saturn at her next appearance. On the 30th, she is followed soon after her rising by Saturn, now to the west of her, but they are at opposite sides of the ecliptick. On the 31st, she rises under the three first stars of the Ram, and it may have been observed, that, notwithstanding the rapidity of her motion in her orbit, there has not been a proportionate difference in the times of her rising, which arises from the inclination of that part of the ecliptick (through which she has been passing for the last four days) to the horizon.

Mercury is an evening star, at his greatest elongation on the 23d. His latitude, on the 1st, is one degree and three quarters, in the twenty-eighth degree of the fourth sign (♋); and it decreases to the 17th, when he passes the ecliptick in his descending node, in the twenty-first degree of the fifth sign (♌). His southern latitude increases to two degrees and three quarters, when he is, on the 31st, in the fourth degree of the sixth sign. The keen astronomer will detect him, in the beginning of the month, near the horizon in west-north-west, about three quarters after Sun-set; and as he moves rapidly, he may, on the 5th and 6th, be discovered near the nebula of the Crab. He travels thence through the barren region between the Crab and the Lion, directing his course to Regulus, passing under (λ) the lowest of the small stars in the head on the 12th. On the 22d, he passes above and near to Regulus, but he falls short of (ρ) the seventeenth, somewhat more than three degrees from and above it. The Moon passes him on the 12th.

Venus is in her inferior conjunction on the 30th, and till that time an evening star. Her latitude, on the 1st, is forty minutes south, in the fifteenth degree of the fifth sign (♌); and it increases to nearly seven degrees, in the seventh degree of this sign; her motion being direct to the 9th, when her latitude is about two degrees, in the sixteenth degree of the same sign; and after this day her motion is retrograde. She is seen under the small stars in the head of the Lion, and her height above the horizon at Sun-set decreases rapidly. The Moon passes her on the 12th.

Mars is an evening star. His latitude, on the 1st, is nearly a degree north, in the eighth degree of the sixth sign (♍); and it decreases about twenty-five minutes, his motion being direct through about eighteen degrees and a half. He is first seen to the east of Regulus, and in the body of the Lion, directing his course to (β) the second of the Virgin, near to and above which star he passes at the end of the month. The Moon passes him on the 15th.

Ceres is an evening star. Her latitude, on the 1st, is eight degrees thirty-nine minutes north, in the twenty-eighth degree of the fifth sign (♌); and it decreases to eight degrees eleven minutes, in the eighth degree of the sixth sign (♍), her motion being direct through about thirteen degrees. She is first seen near to but to the east of (γ) the third of the Lion, and directs her course thence to (θ) the eighth of this constellation. She travels through a very barren space, and we meet with no guide to her in her way, but must content ourselves with the line between (γ) and (θ), but towards the end of it (θ) is a good direction to her, as she will be found under and within two degrees of it. The Moon passes her on the 13th.

Jupiter is a morning star. His latitude, on the 1st, is one degree and a quarter south, in the twenty-fourth degree of the twelfth sign (♓), and it is increased about ten minutes. He is stationary on the 12th, and during the whole month in the same degree. We shall see him, therefore, near the same spot, in the barren space under the four stars in square. The Moon passes him on the 1st, and the 28th.

Saturn is a morning star. His latitude, on the 1st, is two degrees twenty-five minutes south, in the fourteenth degree of the first sign (♈); and it is increased by about eight minutes, his motion being direct till the 12th, and after that retrograde during the whole month, in the same degree. He is seen therefore near the same spot, under (ε) the fifth and (ζ) the sixth of the Fishes, both to the east of him. The Moon passes him on the 3d, and the 30th.

Herschel is on the meridian about eleven at night on the 1st, and about half past nine on the 22d. His latitude is, on the 1st, twelve minutes south, in the twenty-seventh degree of the ninth sign (♐), and continues nearly the same during the whole month, his motion being retrograde through about a degree. We keep therefore (μ) the twelfth of the Archer as a guide to him, when on the meridian, as he is then below it to the west, and slowly receding from it. The Moon passes him on the 23d.

The Sun's apparent diameter, on the 1st, is thirty-one minutes thirty-one seconds, and on the 16th, thirty-one minutes thirty-two seconds;

increasing slowly during the whole of the month. The Moon's apparent diameter, on the 1st at noon, is thirty-two minutes and a half; and it decreases to the 14th, on which day it is about twenty-nine minutes thirty-two seconds. It then increases to the 26th, on which day it is about thirty-three minutes ten seconds; and it afterwards decreases to the end of the month, being, on the last midnight, thirty-one minutes fifty-four seconds. The Sun enters the fifth sign (♌) on the 23d, at twenty-four minutes before one in the morning.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VI.	8	47	8	18	7	46	7	10
VII.	10	47	10	18	9	46	9	10
VIII.	0	52	0	23	11	51	11	15
IX.	2	55	2	26	1	54	1	18
X.	4	50	4	21	3	49	3	13
XI.			6	22	5	50	5	14

AUGUST, 1820.

MY readers are aware, that eclipses of the Sun are of two kinds, either partial, or total. Total, when the Sun's disc is entirely covered by the Moon; partial, when only a part of the Sun's disc is covered by the Moon. This part may be of every possible dimensions, a very small portion only being obscured by the Moon in its passage over the Sun, or so great a part may be obscured as to leave but a very small part of the Sun's disc visible. The magnitude of the part obscured depends on the relative proportions of the apparent diameters of the Sun and Moon, and the direction of the Moon's path by the Sun.

The partial eclipses are divided into two kinds: those, which are annular, or not annular. Annular are those so called, from the body of the Moon wholly covering a part of the body of the Sun in such a manner, that the luminous part of the Sun appears in the form of a ring round the dark orb of the Moon: The breadth of this ring varies every moment, from the time, that the Moon's orb, being totally immersed in that of the Sun, leaves its circumference on one side, till its opposite side touches the opposite side of the Sun's disc. The breadth of the ring is constantly increasing on the one side, from the smallest conceivable speck, till the breadth on both sides is the same; and this equality can be but momentary, as the Moon continues its course, making now the breadth of the ring on the first side greater than that on the second, till at last the ring disappears in the same manner as it began to appear. The ring is perfect to those, from whose eye a line drawn through the centre of the Moon passes through the centre of the Sun: to all others the breadth of the ring will be unequal, as will be evident to any one by an easy experiment.

Make two circles, the one of any diameter you please, the other with a diameter shorter than that of the first. The first circle may be drawn on a large piece of paper, the other is to be drawn on another piece of paper, and cut out exactly, and made black on one side. Now let the first circle represent the Sun, and through the centre of it draw a line to represent a portion of the ecliptick, and through the centre draw another line, making a small acute angle with it. With a pin put through the centre of the black circle, let it move along this second line; and, as it enters into the white circle, representing the Sun, you will see, by the gradual diminution of the white part, how the luminous part of the Sun gradually diminishes, and the obscure part increases. When the whole of the black circle has entered the other, you will see the form of the visible orb of the Sun the moment before the ring is formed: as the black circle moves on, you will see how the ring of light varies in its dimensions; and when the pin passes through the centre of the white circle, you will perceive, that the breadth of the ring is the same all round. This will be only momentary; for, as the black circle proceeds, the thickness of the ring on the side towards which it is moving diminishes, that on the other increasing, till the edge of the black circle touches the edge of the white circle, and the ring altogether disappears.

This little experiment shows you the state of the Sun and Moon, when the ring is at one time perfect. Now, instead of drawing the second line through the centre of the white circle, take a point at a little distance from the centre in the first line, and draw your second line through that point, and move the black circle in the direction of that line; and you will, as before, mark during the progress the formation of the white ring around it, but it will never be of the same uniform thickness all round.

By varying the situation of the point taken in the diameter of the white circle, you will perceive, what a variety of forms the annular eclipses are capable of; and you may pursue the experiment, by extending the diameter of the white circle, and taking a point in the line thus extended without the circle, and draw through it the line marking the path of the Moon's centre over the disc. As before, make the pin through the black circle move in this line, and every form of eclipse may be made clear to your conceptions, and in a better manner perhaps than can be expressed by words. For you may draw the line of the Moon's path either above or below the diameter drawn through the white circle; and this will show you the cases, when the Moon enters the Sun's disc on the northern or southern side. The extreme cases will be seen; the Moon just touches the Sun, or enters into its disc, making only a partial eclipse.

The case of a total eclipse may be explained in the same manner. But for this purpose the circle, representing the Moon, must have the same or a greater diameter than that representing the Sun. As before, you will make the black circle pass over the other, and you will then readily perceive that there cannot be a total eclipse, if the apparent diameters are the same, unless, in the passage of the black over the white circle, the centres at one time coincide, and then the total eclipse will be momentary, and it must be a central eclipse. When an eclipse is to be represented, and it is total for some little time, the diameter of the black circle must be made larger than that of the white circle, and you will perceive, from that experiment, how short a time will elapse, even in a central eclipse, during which the white circle is completely covered by the black, or there is a total eclipse of the Sun.

This little experiment may appear trifling: but I should recommend it to the particular attention, not only of the common observers in the tract of country, where the approaching eclipse will be annular, for it is not undeserving of the notice of the greatest astronomer in Europe. For, if, he should have before his eyes for some time, in a variety of figures, the accurate state of the solar orb, according to his proportion of the diameters of the Sun and Moon at various intervals, during the eclipse, his eye will be so accustomed to mark the variations, that at the time of the eclipse he will find himself much more competent to determine the appearance, that the solar orb gradually exhibits to him. This was not thought an unworthy practice, by a wise nation, whose writings will, when the learned world[*] is become, and it will though probably in a very remote age become Christian, be thought more worthy of regard, than the miserable effusions of Greece and Rome, by which in our youth we are half heathenised. The learned of this nation did not disdain to have the figures of the crescent of the Moon, in its various forms after the conjunction, displayed to those, who noted its early appearance; and we should endeavour, in the most familiar manner possible, to make our ideas plain and clear to all, who stand in need of instruction. Recommending therefore to my readers to try the experiment in the way I have set it forth to them, I proceed to the appearances in the heavens for this month.

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[*] Ου πολλοι σοφοι κατα σαρκα, ȣ πολλοι δυνατοι, ȣ πολλοι ευγενεις. Is not this as true now as in the time of the writer of these Greek words.

The Moon's latitude, on the 1st at midnight, is four degrees fourteen minutes, in the twentieth degree of the second sign (♉); and it increases to the 4th, on which day it is at noon somewhat more than five degrees nine minutes, in the twenty-second degree of the third sign (♊); and it then decreases to the 12th, when she passes the ecliptick in her descending node, before one in the morning, in the twenty-third degree of the sixth sign (♍). Her southern latitude now increases to the 19th, when it is at noon five degrees fourteen minutes, in the twenty-sixth degree of the ninth sign (♐); and it decreases afterwards to the 25th, when she passes the ecliptick in her ascending node, between nine and ten in the morning, in the twenty-fourth degree of the twelfth sign (♓). Her southern latitude now increases to the end of the month, being, on the last midnight, five degrees sixteen minutes, in the twenty-sixth degree of the third sign (♊).

The Moon rises, on the 1st, about half past ten at night, with the Pleiades, having the three first stars af the Ram above her to the west, and is soon followed by the small stars in the tail of the Ram, passing (ζ) the sixth soon after midnight, and she directs her course to the Pleiades. On the 2d, she rises under the Pleiades, now to the west of her, and will be perceived to direct her course to the second of the Bull, or star in the tip of the northern horn. On the 3d, she rises with the second of the Bull to the east of her, and is seen, during the morning of the 4th, to approach, but does not reach this star till after Sun-rise.

On the 5th, the Moon rises in the morning soon after the second of the Bull, now to the west of her, and from her great northern latitude passes near to (χ) the tenth of the Waggoner, about Sun-rise. On the 6th, she rises with the two first of the Twins to the east of her, and will be seen to direct her course under the second of them. On the 7th, she rises under and almost in a line with the two first of the Twins; and on the 8th is new Moon, at forty-one minutes past nine at night, but from her great northern latitude without an eclipse.

On the 10th, the crescent of the Moon is seen in the evening after Sun-set in the west, from her unfavourable position near the horizon, Mars being above her to the east, to whom she is directing her course. On the 11th, she is seen to have been approaching, though with a very slow pace, towards Mars, still at some distance from her to the east; above her are the small stars in the head of the Virgin, and she is directing her course under (β) the second of this constellation. On the 12th, she is seen under (η) the seventh of the Virgin and Mars, but she does not pass him till an hour after Moon-set. On the 13th, she is seen between Mars and the first of the Virgin, the planet to the west and the star to the east of her, and she is directing her course to the star. On the 14th, she is seen to have passed Spica, but to have receded very slowly from it, and the attentive readers will have noticed how short, comparatively speaking, her duration above the horizon, after Sun-set, has been. Three causes contribute to this effect; the unfavourableness of her position, the slowness of her motion in her orbit, and the direction of her course, declining southwards from the ecliptick. On the 15th, she is seen under the tenth and eleventh of the Virgin to the west, and the first of the Balance to the east of her. On the 16th, she is seen under the two first stars of the Balance to the west, and the second of the Scorpion to the east of her, directing her course to Antares. On the 17th, she is seen to the west of Antares, directing her course near to but below him, and she does not reach him till about four hours and a half after Moon-set.

On the 18th, the Moon is on the meridian about Sun-set, and when the stars appear we shall see Antares, now at some distance from her to the west. On the 19th, she is on the meridian at seven minutes past eight in the evening, having at some distance above her (μ) the twelfth of the Archer, and below and near to her to the west (γ) the third, and to the east (δ) the fourth of the Archer. From her great southern latitude her height above the horizon is less than ten degrees, being less, by somewhat more than five degrees, than the meridional height of the Sun at the winter's solstice. This makes her stay above the horizon, from the time of being on the meridian till Moon-set, much shorter than half of the shortest day in the year. In fact, she passed the winter's solstice little more than half an hour before she came to the meridian. It may amuse some of my readers, when they view the Moon on the meridian, to consider the advantage they have in winter above those countries, where the Sun on the shortest day is of the same height only above the horizon, at noon, as the Moon now is; and they may easily discover those countries, if they have a globe of the Earth. On the 20th, the Moon is on the meridian at nine minutes past nine, having the small stars in the head of the Archer above her to the west.

On the 21st, the Moon is on the meridian at eleven minutes past ten at night, having the two first stars of the Goat almost directly above her, but, from the greatness of her southern latitude, at some distance. Her latitude has been decreasing, so that her meridional height above the horizon has been increasing from that cause, and it has been farther increased by the height of her place on the ecliptick being increased. These two circumstances will of course be noticed by the teachers of astronomy. On the 22d, she is on the meridian at ten minutes past eleven, having the small stars in the tail of the Goat to the east of her, and she passes (ε) the fifth before Moon-set, directing her course between the two highest and the two lowest of these stars.

On the 23d is full Moon, at thirty minutes past ten at night, but from her too great southern latitude without an eclipse. She rises in the evening about Sun-set, and her splendour will afterwards eclipse the small stars near to her. Jupiter will be seen at some distance to the east of her. On the 24th, she rises nearly with Jupiter, still to the east of her, and she directs her course to him. On the 25th, she rises under Jupiter, now to the west of her, as she passed him about an hour after Sun-rise this day; and she directs her course above Saturn to the east of her. On the 26th, she is followed soon after her rising by Saturn, now to the west of her. On the 27th, she rises under the three first stars of the Ram to the east of her; Saturn now rising at some distance from her to the west. On the 28th, she rises under the three first stars of the Ram, now to the west of her, and is seen to direct her course to the Pleiades to the east of her. On the 29th, she rises with the Pleiades, very near to them, but to the east; and her recess from them is the chief feature in her course. On the 30th, she is followed soon after her rising by the second of the Bull, to which star she is directing her course; and on the 31st, she rises soon after the second of the Bull, now to the west of her, having passed near this star in the afternoon, at thirty-four minutes past three.

Mercury is in his inferior conjunction on the 19th, being, of course, before that time an evening star. His latitude, on the 1st, is two degrees fifty-seven minutes south, in the fourth degree of the sixth sign (♍); and it is nearly three degrees and three quarters on the 5th, in the fifth degree of this sign, when he is stationary. After this his motion is retrograde, his latitude increasing to the 16th, when it is four degrees and three quarters, in the thirtieth degree of the fifth sign (♌). It then decreases to the end of the month, when it is one degree seventeen minutes, in the twenty-second degree of this sign; and in this degree he is stationary on the 29th. From his southern latitude and unfavourable position he will be detected by few in the early part of the month; but at the end of it, his position becoming more favourable, he will offer himself with sufficient facility to the diligent observer. On the 28th, he is near to and under (ξ) the sixteenth of the Lion, and near to that star he will be seen for the three following days. The Moon passes him on the 10th.

Venus is a morning star. Her latitude, on the 1st, is seven degrees south, in the seventh degree of the fifth sign (♌); and it increases to the 13th, when it is seven degrees thirty-two minutes, in the first degree of this sign. It then decreases to nearly five degrees and three quarters in this degree, as she is stationary in the thirtieth degree of the fourth sign (♋) on the 23d. At first she is too near the Sun to be visible, but the favourableness of her position, notwithstanding her great southern latitude, will, before the middle of the month, point her out as the precurser of the Sun. She is in a very barren space in the southern part of the Crab, at a considerable distance under the two first of the Twins; and her motion being very slow, she is seen near the same spot to the end of the month. The Moon passes her on the 7th.

Mars is an evening star. His latitude, on the 1st, is thirty-four minutes north, in the twenty-seventh degree of the sixth sign (♍); and it decreases to about a quarter of a degree, in the sixteenth degree of the seventh sign, his motion being direct through about nineteen degrees and three quarters. He is first seen to the east of (β) the second of the Virgin, from which star he proceeds to (η) the seventh, passing under and near to it on the 10th. On the 18th, he passes (γ) the third of the Virgin, but at a greater distance; and he finishes his course between this star and the first, but nearest to the latter star. The Moon passes him on the 12th.

Ceres is an evening star. Her latitude, on the 1st, is eight degrees five minutes north, in the eleventh degree of the sixth sign (♍); and it decreases to about seven degrees forty minutes, her latitude, on the 25th, being seven degrees and three quarters, in the twenty-second degree of this sign. She will be seen therefore, at first, under and to the east of (θ) the eighth of the Lion, and she directs her course to the small stars in the head of the Virgin. It is a barren space through which she passes in her course; but on the 24th we shall discover her between the second of the Lion (β) and the sixteenth of the Virgin (ξ) the most western star in this constellation, being above and less than two degrees from it. To see her, however, we must have a good horizon between west and west-by-north. The Moon passes her on the 11th.

Jupiter is on the meridian about three quarters past two in the morning of the 3d; at two on the 15th; and at one on the 27th. His latitude, on the 1st, is one degree twenty-six minutes south, in the twenty-third degree of the twelfth sign (♓); and it increases nearly seven minutes, his motion being retrograde through about three degrees. He is seen, when on the meridian, under the four stars in square, but nearest to the line passing through the two eastern of them; and, at the end of the month, he is nearly equidistant from this line and that drawn through the two western of these stars. The Moon passes him on the 25th.

Saturn is on the meridian about half an hour before Sun-rise on the 1st, and about three in the morning on the 19th. His latitude, on the 1st, is two degrees thirty-three minutes south, in the fourteenth degree of the first sign (♈); and it increases about eight minutes, his motion being retrograde through little more than a degree. He is seen, therefore, near the same spot, under (ξ) the fourteenth of the Fishes, and nearly in a line with the highest and lowest of the four stars in square. The Moon passes him on the 26th.

Herschel is on the meridian at fifty-two minutes past eight at night on the 1st, and at half past seven on the 23d. His latitude is about twelve minutes south, in the twenty-sixth degree of the ninth sign (♐); and it remains nearly the same, his motion being retrograde through less than half a degree. He has, when on the meridian, (μ) the twelfth of the Archer above him to the east, and (θ) the eighth of the Serpent-bearer below him to the west, being nearly in the middle between these stars. The Moon passes him on the 19th.

The Sun's apparent diameter, on the 2d, is thirty-one minutes thirty-five seconds; and on the 19th, thirty-one minutes forty-one seconds. The Moon's apparent diameter, on the 1st at midnight, is thirty-one minutes and a half; and it decreases to the 11th, during which day it is about twenty-nine minutes twenty-eight seconds.

It then increases to the 24th, when it is, at noon, thirty-three minutes twenty-eight seconds; and it afterwards decreases to the end of the month, being, on the last midnight, thirty minutes forty seconds. The Sun enters the sixth sign (♍) on the 23d, at fifty-four minutes past five in the morning.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VII.	8	42	8	15	7	45	7	12
VIII.	10	47	10	20	9	50	9	17
IX.	0	50	0	23	11	53	11	20
X.	2	45	2	18	1	48	1	15
XI.	4	46	4	19	3	49	3	16
XII.					5	55	5	22

SEPTEMBER, 1820.

AN eclipse of the Sun was formerly an object of terrour to the inhabitants of the Earth, and history records remarkable results from them, such as the stopping of a battle, the defeat of an expedition, and the advantage taken of an ignorant population by the prediction of them. It is now viewed with admiration by the common observer, and employed in the promotion of science by those, who are farther advanced in knowledge. The former party may be made useful by a little attention to a few circumstances, and the latter are called upon to observe them with a greater degree of precision.

The first thing is to be prepared with easy means to observe this phœnomenon to advantage; and Dr. Maskelyne has given us such plain directions upon this subject, that I cannot do better than quote his own words.

"Dark glasses should be used to defend the eye from the intensity of the Sun's light. Transparent glasses, smoked over the flame of a candle or lamp, will give a more distinct and agreeable vision of the disc of the Sun than any tinged or coloured glasses will do. Provide two pieces of glass of convenient length, not too thick (the common crown glass, used for windows, will do as well as any), wipe them clean and dry. Warm them a little by the fire, if the weather be cold, to prevent their cracking when applied to the flame of the candle: then draw one of them gently, according to its whole length, through the flame, and part of the smoke will adhere to the glass. Repeat the same operation, only leaving a little part at one end now untouched. Repeat the operation, leaving a further part at the same end untouched; and so each time leave a further part of the same end untouched, till at last you have tinged the glass with several dyes, increasing gradually in blackness from one end to the other. Smoke the other glass in like manner; and apply the two glasses one against the other, only separated by a rectangular border, cut of brass or card paper, the smoked faces being opposed to each other, and the deepest tinges of both placed together at the same end. Tie the glasses firmly together with waxen thread, and they are ready for use. The tinge at one end should be the slightest possible, and at the other end so dark, that you cannot see the candle through it. By this contrivance, applied between your eye and the Sun, you will have the advantage, not only of seeing the Sun's light white, according to its natural colour, and his image more distinct than through common dark glasses, but also of being able to intercept more or less of his light, as you please, and as the clearness or thickness of the air requires it, by bringing a darker or lighter part of this combined dark glass before your eye; which will be a great convenience at all times, but particularly when the brightness of the Sun is liable to sudden changes from flying clouds."

Having prepared yourself with a smoked glass, the next thing is to have your watch regulated by some watchmaker, if you are fortunately near enough to one, who notes the passage of the Sun over the meridian; and you will by that note the time of the Moon's appulse to the Sun and departure from him; and also the appearances, as they represent themselves to you during the eclipse. These observations may be of great use; for they will be compared with others of the same kind, and the place of observation in general will be sufficiently known by the description of its distance and bearing from the adjoining country towns.

The next things to be prepared are a thermometer, barometer, and a burning glass. The thermometer to note the variations of heat, if there should be any, during the eclipse, or for some little time before and after it: the barometer to note the variation, if any, in the pressure of the air during the eclipse, or for some time before and after it: the burning glass to mark the variations, if any, in the power of the Sun to set fire to paper, rag, or any other substance held in the focus of it during the eclipse. It will be useful to prepare yourself for this last experiment, by trying it previously, with glasses of different powers, on paper, dried rag, rag moistened with water and with spirits of wine, and paper with a small quantity of gunpowder on it. Thus you will readily, at the time, use these different substances, or whatever may suggest themselves as fit for the purpose; and be careful to note the time, when the different substances took fire, or when any of them failed. It will be particularly necessary for those, who live in the tract, where the eclipse is annular, to use the burning glass at the time when the ring is most perfect, that is, when the Sun exercises the least power of exciting heat.

They, who have telescopes, and one that magnifies about thirty or forty times is sufficient, should, previous to the eclipse, note the spots, if any, in the Sun, and make a diagram of its disc, with those spots upon it. He will then note down the time, when each of those spots is eclipsed, the appulse of the Moon to the western part, and also to the eastern part of it.

It is not probable, that the diminution of light will be sufficiently considerable to give any observers the view of the planets or fixed stars. But they should be prepared for such an occurrence, and will look for Mercury about eighteen degrees to the west of the Sun, near to Regulus; for Venus, about forty-one degrees westward of the Sun; and for Mars, about thirty-five degrees to the east of the Sun, and not far from Spica Virginis.

Mr. Baily has given the following calculation for the eclipse, from Burckhardt's tables of the Moon, and De Lambre's tables for the Sun, and according to him, " the ecliptick conjunction will take place on September 7, 1820, at

1^{h} 51′ 37″, 3 P.M. *apparent* time, or } at Greenwich."
1 49 26, 2 P.M. *mean* time }

" And, at that time, we shall have the

	s	°	′	″
True longitude of the luminaries........	5	14	47	40,7
True latitude of the Moon (north)......			44	39,4
Moon's horary motion from the Sun.....			27	1,7
——— horary motion in latitude (decreasing)........................			2	42,0
——— horizontal parallax			53	53,0
——— semidiameter.......................			14	41,0
Sun's semidiameter			15	54,8
—— horizontal parallax..				8,7
—— declination (north)..................		5	59	41,0

" From these elements it may be determined, that the Moon's shadow first touches the Earth's disc at 11^{h} 23′ A.M. *apparent* time at Greenwich, in north latitude 59° 43′, west longitude 90° 50′; and that it finally leaves it at 4^{h} 39′½ P.M. *apparent* time at Greenwich, in north latitude 3° 21′, east longitude 20° 25′. Consequently the total duration of the general eclipse to the inhabitants of the Earth will be about 5h 17′: but at no one place in particular will the duration be much more than half that time."

From De Lambre's principles, he has also constructed another table, by which will be shown the several places, expressed by positions of latitude and longitude, through which the centre of the Moon's shadow will pass in its progress across the Earth's disc, at the several times therein mentioned.

Apparent time at Greenwich P. M.			Latitude North.			Longitude from Greenwich.				*Apparent* time at the place.			
h	′	″	°	′	″		°	′	″	h	′	″	
12	54	39	81	39	29	W.	149	32	55	2	56	27	A.M.
	55	0	83	39	34		129	44	37	4	16	2	
1	0	0	82	24	34		42	38	12	10	9	27	
	8	16	76	6	21		17	3	15	12	0	0	
	10	0	75	23	11		14	31	41	12	11	53	P.M.
	20	0	69	9	41		5	52	11	12	56	31	
	30	0	64	13	27		0	46	50	1	26	53	
	40	0	59	47	31	E.	2	50	42	1	51	23	
	50	0	55	44	40		5	48	32	2	13	14	
2	0	0	51	56	26		8	26	4	2	33	44	
	10	0	48	18	42		10	57	6	2	53	48	
	20	0	44	49	25		13	32	32	5	14	10	
	30	0	41	25	32		16	23	32	3	35	34	
	40	0	38	3	53		19	41	0	3	58	56	
	50	0	34	40	41		23	59	43	4	25	59	
3	0	0	31	7	19		30	24	13	5	1	37	
	8	11	27	10	30		46	2	4	6	12	19	

From this table he makes the following observations.

"It will be seen that the *central* eclipse commences in north latitude 81° 39′ 29″, west longitude 149° 32′ 55″, when the Sun and Moon will rise together (the centre of the Moon being directly on the centre of the Sun's disc) to the inhabitants of that part of the globe, at 2h 56′ 27″ in the morning, corresponding to 12h 54′ 39″ (or 0h 54′ 39″ *) in the afternoon at Greenwich: that the Sun will be centrally eclipsed on the meridian (or exactly at noon) in north latitude 76° 6′ 21″, west longitude 17° 3′ 15″, when it is 1h 8′ 16″ in the afternoon at Greenwich: and that the Sun will set centrally eclipsed in north latitude 27° 10′ 30″, east longitude 46° 2′ 4″ at 6h 12′ 19″ in the afternoon, corresponding to 3h 8′ 11″ at Greenwich.

"If the points, mentioned in the second and third columns of the above table, be marked on a good map, and lines be drawn connecting these points, we shall have the path of the centre of the Moon's shadow across the globe. Whence it will be seen, that the centre of the shadow, having entered the Earth's disc near the North Pole, will proceed between the Shetland islands and the coast of Norway down the North Sea, and enter the continent of Europe on the coast of Westphalia, about half way between the Ems and the Weser. It will thence proceed, nearly in a straight line, across Germany and the Tyrol country, and enter the gulf of Venice, about midway between Trieste and Venice. Traversing that gulf it will cross the heel of Italy; and, after skirting the coast of the Morea and Candia, will pass directly over Alexandria in Egypt; and finally leave the Earth in Aràbia, near the Persian gulf."

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* "That is, 54′ 39″ after 12 o'clock *at noon*. The English astronomers begin the day at noon; but the French reckon from midnight, as in the civil mode of reckoning. There cannot however be any ambiguity, in the present case, as to the 12h.

Having thus prepared you to observe yourself, and also to suggest to your friends abroad (where the eclipse, particularly the annular eclipse, is visible), what is requisite for them to notice during the eclipse, I proceed to describe the other appearances in the heavens during this month.

The Moon's latitude, on the 1st, is five de, grees thirteen minutes north, in the second degree of the fourth sign (♋); and it decreases to the 8th, when she passes the ecliptick, in her descending node, between six and seven in the morning, in the twenty-fourth degree of the sixth sign (♍). Her southern latitude increases to the 15th, when it is at noon five degrees seventeen minutes, in the twenty-second degree of the ninth sign (♐); and it then decreases to the 21st, when she passes the ecliptick in her ascending node, about nine at night, in the twenty-third degree of the twelfth sign (♓). Her northern latitude then increases to the 27th, when it is, at midnight, five degrees seventeen minutes, in the twenty-second degree of the third sign (♊); and it decreases afterwards to the end of the month, being, on the last midnight, four degrees and a quarter, in the last degree of the fourth sign (♋).

The Moon rises, on the 1st, between eleven and twelve at night, under the tenth of the Waggoner, and is perceived, during the morning of the 2d, to direct her course to the second of the Twins.

On the 3d, the Moon rises in the morning soon after the second of the Twins, and will form with the two first of this constellation above her, and Venus at some distance below her, a particular groupe before Sun-rise. On the 4th, she is followed soon after her rising by the two stars and included nebula of the Crab, passing the highest of these stars before Sun-rise. Venus is at the opposite side of the ecliptick to her, and at a greater distance from it. On the 5th, she rises under the small stars in the head of the Lion, Venus being now at some distance from her to the west; and on the 7th is new Moon, at fifty-two minutes past one in the afternoon, at which time the Sun is eclipsed by her; the eclipse beginning at Greenwich at twenty-four minutes and a quarter after noon. The greatest obscuration is at fifty-three minutes past one, and it ends at sixteen minutes and three quarters past three. The digits eclipsed are ten degrees twenty-seven minutes and a half on the Sun's northern limb. Preceding remarks point out where the eclipse is annular.

On the 9th, the crescent of the Moon is seen near the horizon at Sun-set in west-by-south, her unfavourable position, and southern latitude occasioning her to set, though so long after the conjunction, within half an hour after Sun-set. Mars, with the first of the Virgin, will be perceived to the east of her. On the 10th, she is seen still near to the horizon at Sun-set, and to the west of the first of the Virgin, as she passed this star at three minutes past four; and Mars will be seen near to it. On the 11th, she is seen under the tenth and eleventh of the Virgin, Mars and the first being at some distance from her to the west. Her increasing southern latitude keeps her still near the horizon. On the 12th, she is seen under the two first stars of the Balance to the west of her, directing her course to Antares. On the 13th, she is seen under the fourth and second of the Scorpion, but she does not pass Antares till after Moon-set. On the 14th, she is seen to the east of Antares, having passed this star about ten in the morning; and we shall notice the greatness of her southern latitude by her being so much below the star.

On the 15th, the Moon is on the meridian at three minutes past six at night, being at this time only about ten degrees above the horizon, and consequently her stay above it before

Moon-set is remarkably short, being only about three hours and a quarter. This is owing to her southern latitude being greatest on this day, and this circumstance will merit the attention of the teachers of astronomy. To the east of her is the third of the Archer, above and near to which star she will pass, but not till after Moon-set. On the 16th, she is on the meridian at two minutes past seven, having above her the small stars in the head of the Archer to the east. She passes between (σ) the eighteenth and (ζ) the sixth about Moon-set, and nearest to the latter star. On the 17th, she is on the meridian at two minutes past eight, having above her to the east the two first stars of the Goat, and to the west the small stars in the head of the Archer. She is directing her course to Jupiter. On the 18th, she is on the meridian at one minute past nine, the two first stars of the Goat being now to the west.

On the 19th, the Moon is on the meridian at fifty-eight minutes past nine at night, having near to and to the west of her the four small stars in the tail of the Goat, having passed the most eastern of these stars about Sun-set: Jupiter and Saturn are now to be noticed at different distances to the east of her, as she will pass near both of them. On the 20th, she is on the meridian at fifty-two minutes past ten, having now below her to the east, near to the horizon, but much nearer to the meridian, Fomalhaut, and above her Jupiter to the east, towards whom she is making rapid approaches. On the 21st, she is on the meridian at about three quarters past eleven, Jupiter being now to the west of her, as she passed this planet about half an hour before noon, and the rapidity of her progress will be marked by her present distance from him. Saturn is at a considerable distance from her to the east. An eclipse takes place before she sets.

On the 22d is full Moon, at forty-eight minutes past six in the morning, at which time she is eclipsed, though not visibly to us. The eclipse begins at thirteen minutes and twenty seconds past five in the morning; the Moon sets at fifty-seven minutes and a quarter past five; the middle is at forty-one minutes fifty-four seconds past six; the end at ten minutes twenty seconds past eight; and the digits eclipsed are ten degrees twelve minutes on the Moon's southern limb. They, who have a good horizon in the west, will thus for a short time perceive a small part of her disc eclipsed. At night she rises under the four small stars in square, and we shall see her about an hour after, between Jupiter and Saturn, but nearest to the latter planet, by whom she will pass, and her passage above him is the chief feature in her course. On the 23d, she is soon followed after her rising by Saturn, now to the west of her, and at the opposite side of the ecliptick. She passed him at about half past one this morning, but, from the rapidity of her motion, has advanced considerably since that time from him to the east. On the 24th, she rises under the three first stars of the Ram. On the 25th, she rises with the Pleiades to the east of her, but she does not reach them till after Sun-rise.

On the 26th, the Moon rises soon after the Pleiades, now to the west of her, and is soon followed by the second of the Bull (β), to which star she is directing her course. On the 27th, she rises with and near to the second of the Bull (β), but to the west of it, as she passes it at forty-nine minutes past ten. On the 28th, she is perceived to direct her course to (β) the second of the Twins. On the 29th, she rises with the two first of the Twins to the east of her, and before Sun-rise we shall notice Venus to the east of her, at the opposite side of the ecliptick. On the 30th, she rises under the two first stars of the Twins, now to the west of her.

Mercury is a morning star, at his greatest elongation on the 6th. His latitude, on the 1st, is fifty-nine minutes south, in the twenty-third degree of the fifth sign (♌); and it decreases to the 5th, when he passes the ecliptick in his ascending node, and in the twenty-fifth degree of this sign. His northern latitude now increases to the 19th, when it is one degree fifty-one minutes, in the seventeenth degree of the sixth sign (♍); and it then decreases to the end of the month, being, on the last day, one degree twenty-one minutes, in the seventh degree of the seventh sign (♎), his motion being direct through about thirty-four degrees. His position is very favourable for observation in the former part of the month. On the 7th and 8th, we have an excellent directer to him, as on the 7th he passes Regulus (α Leonis) at thirty-one minutes past seven at night. the star being only ten minutes and three quarters south of him. Consequently in the morning he will be detected by a telescope with ordinary power, or probably by many persons with the naked eye, near to and to the west of this star, and on the morning of the 8th near to but to the east of it. He thence moves in the barren space of the Lion, and eludes the search of most people by being immersed in the solar rays. The Moon passes him on the 5th.

Venus is a morning star. Her latitude, on the 1st, is five degrees and three quarters south, in the second degree of the fifth sign (♌); and it decreases to less than two degrees, in the twenty-second degree of this sign, her motion being direct through about twenty-one degrees. She is seen, therefore, first below and to the west of the two stars and included nebula of the Crab, which she passes on the 6th, but from her southern latitude at some distance from them. Her course, in a barren space, is directed to Regulus to the east of her, and she passes above (ξ) the sixteenth of the Lion on the 27th, finishing her course between (ξ) and Regulus, but nearest to the former star. The Moon passes her on the 4th.

Mars is an evening star. His latitude, on the

1st, is thirteen minutes north, in the sixteenth degree of the seventh sign (♎); and it decreases to the 20th, when he passes the eclíptick in his descending node, in the twenty-eighth degree of this sign. His southern latitude now increases to nearly seven minutes, his motion being direct through nearly twenty-one degrees. From the unfavourableness of his position, he is at first an hour and a quarter above the horizon after Sun-set, and his height above it at Sun-set is only about nine degrees, the time and height daily decreasing. He passes above the first of the Virgin on the 9th, and he finishes his course under the tenth and eleventh of this constellation, near to the latter star. The Moon passes him on the 10th.

Ceres is an evening star. Her latitude, on the 1st, is seven degrees thirty-eight minutes north, in the twenty-fifth degree of the sixth sign (♍); and on the 25th seven degrees twenty-four minutes, in the sixth degree of the seventh sign (♎), her motion being direct through about thirteen degrees and a half. Though she is so much nearer the Sun than Mars, her great northern latitude gives her the advantage over him in point of height and duration after Sun-set above the horizon. But then the power of the solar ray, having a greater influence upon her, will conceal her from most observers. She is, in fact, in conjunction with the Sun soon after the end of the month. Her course lies in a barren space in the head of the Virgin to the east of (ξ), passing under (ο) the fifteenth on the 5th. The Moon passes her on the 8th.

Jupiter is on the meridian about midnight on the 10th, and at eleven on the 25th. His latitude, on the 1st, is one degree thirty-two minutes, in the twentieth degree of the twelfth sign (♓); and it increases, and then decreases about a minute, during his retrograde motion through somewhat more than six degrees. He is seen, therefore, in the barren space under the four stars in square, directing his course to (φ) the twenty-second of the Water-bearer, situated on the eastern margin of the stream from the Urn, but he stops short of it within a degree. The Moon passes him on the 21st.

Saturn is on the meridian at two in the morning of the 3d, and at one on the 19th. His latitude, on the 1st, is two degrees forty-one minutes south, in the thirteenth degree of the first sign (♈); and it increases about three minutes, his motion being retrograde through somewhat more than two degrees. He is seen, therefore, when on the meridian, under the fourth (δ) of the Fishes, near to it to the east, and directly under it at the end of the month. The Moon passes him on the 23d.

Herschel is a morning star. His latitude, on the 1st, is twelve minutes south, in the twenty-fifth degree of the ninth sign (♐); and continues nearly the same during his small direct motion through about twenty minutes. He will be therefore seen in the same spot, nearly midway between the eighth of the Serpent-bearer and the twelfth of the Archer. The Moon passes him on the 15th.

The Sun's apparent diameter, on the 3d, is thirty-one minutes forty-seven seconds; and on the 25th thirty-one minutes fifty-nine seconds. The Moon's apparent diameter, on the 2d at midnight, is half a degree; and it decreases to the 7th, on which day it is about twenty-nine minutes twenty-six seconds. It then increases to the 21st, when it is, at midnight, thirty-three minutes and a half; and it decreases afterwards to the end of the month, being, on the last midnight, twenty-nine minutes fifty-eight seconds. The Sun enters the seventh sign (♎) on the 23d, at forty-eight minutes past three in the morning.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
VII.	6	46	6	21	5	52		
VIII.	8	51	8	26	7	57	7	28
IX.	10	54	10	29	10	0	9	31
X.	0	49	0	24	11	55	11	26
XI.	2	50	2	25	1	56	1	27
XII.	4	56	4	31	4	2	3	33
I.	6	46	6	21	5	52	5	23

OCTOBER, 1820.

ASTRONOMERS must prepare themselves for disappointments. After all the preparations, that have been made for an observation, a cloudy day or night may frustrate their hopes and expectations. In London the Sun is eclipsed not unfrequently at noon by a fog, impregnated with its smoke, which produce a darkness far superior to that occasioned by any partial eclipse of the Sun by the Moon; and the good people of the metropolis are witnesses of this phœnomenon, without any endeavour on their part to prevent the atmosphere from being impregnated with noxious vapours. A vomitory of smoke has been lately erected within a few yards of the place, where I am now sitting; and I am treated daily with an eruption, similar to, though not equal in magnitude to that from Mount Vesuvius, before it emits its shower of stones and fiery lava. The same thing is going on in other parts of the metropolis; for private advantage is pursued, without regard to the convenience, health, or comfort, of the publick; and if the smoke issues a little above the houses, it is not made a question, what is afterwards to become of it. I have before observed, that a very great proportion of the smoke of London is owing to the inattention of the legislature to the construction of the vomitories, by which it is discharged: though a person has nothing to do but to take a walk on Blackfriars' Bridge, and he will perceive, in the difference of the quantity of smoke emitted by the chimnies of various furnaces before him, that it is in the power of the proprieters of them to prevent, at a very inconsiderable expense to themselves, the air from being blackened by their furnaces, or impregnated with noxious vapours from the substances, which they are melting. In one place a chimney will be seen, which emits ten times the smoke as its neighbour, though the consumption of coal in the latter is probably ten times as great as that in the former.

The remarks of the people of London on the colour of the lunar orb during the eclipse cannot be of any use, for they see through an artificial atmosphere; and it will be difficult if not impossible to say, what effect this may produce on an object seen through it. In other parts of the world, where they breathe a purer air, attention will have been paid to the colour of the lunar orb; and it may be amusing to contrast the different accounts from the Continent, with those which are given in London. I do not imagine, that this will weigh much as an argument for purifying the air of the great city; for, if the fine ladies in town can bear with so much composure the change of colour in the furniture of their drawing rooms, by the smoke, in which they live, as in the top of a chimney, it is not likely, that any argument drawn from the Sun and Moon, will have any effect upon them.

A strange inconsistency takes place in town upon this subject. If flame is seen to be emitted from the top of my chimney, engines immediately hurry to the place, and I am compellable to pay a fine on the occasion; but if I walk a few hundred yards from my house, I see volcanoes of fire before me, and no notice is taken of them. The flame issues in torrents from the top of the chimney, but because it belongs to a furnace, the proprieters are allowed to display the phœnomenon *ad libitum*. Surely if it is right, and I think it very right, that individuals should suffer for letting flame proceed from the chimnies of private houses, the proprieters of furnaces, who are corrupting the air in a hundred-fold greater degree, should be under the same restrictions.

The chimney of a furnace should never be permitted to be built directly over it, but at such a distance from it, that the flame, issuing from the fire, should never enter into it. At some furnaces this method is followed with great advantage to the proprieter; for the flame and smoke, being conveyed by an iron tube to the chimney, the latter never receives any injury, however intense the heat of the furnace may be; and, if the furnace requires any repair, it is made in a short time, and with very little inconvenience or stoppage to the works. A chimney thus made will last as long or much longer than a common chimney; and if of a proper height, as in some places, the smoke from it will exceed very little that from a common fire place; and from the greater height the contamination of the atmosphere is less considerable.

I suggested these, and a few other remarks on this subject, in a paper communicated to a few members of both houses the winter before last, and found not a dissentient voice on the nature of the grievance, but on the contrary some strong convictions, that the remedy was easy, and that it was deserving of publick notice. I shall hope, that some of my readers will be duly impressed with the propriety of them; and if so, I shall beg of them to exert their influence in the proper quarters, that if, at any rate, the evil cannot be got rid of, it may not be permitted to increase, by any person being at liberty to erect his steam engine, without regard to the comfort of his neighbours, or that of the publick. In such a case I shall be glad, that the colour of the orb of the Moon in an eclipse occasioned these observations.

By this month accounts will have been received from the Continent of the appearance of the eclipse in various places; and it may be amusing to take a map of Germany, and colour it like the map, that accompanies this work. For this we are indebted to Mr. Baily, who very kindly gave me permission to take a copy of the map he had made for his Memoir. In this map is seen the tract of country in which the eclipse is annular, the black line crossing it shows the part of the country to whose inhabitants the centers of the Sun and Moon will appear to coincide, and an uniform luminous ring, equal in breadth to about one twenty-ninth part of the Sun's diameter, will surround the body of the Moon. The inhabitants of the country marked out by the dingy space on each side of the black line, will have a different phœnomenon. They who are situated to the west of the black line, will at the time of the middle of the eclipse see the upper limb of the Moon in contact with the upper limb of the Sun, and consequently the unobscured portion of the Sun's disc will be seen round the under part of the Moon; but they who live to the east of the black line will see the lower limb of the Moon in contact with the lower limb of the Sun. As we live at such a distance from the dingy tract, we must be contented with reports from others of the exhibition of the ring, and be satisfied with appearances, which, whilst we are on this

Earth, may never again be presented to us. The map will show us, how to draw a more exact one from actual observations; and we shall probably derive great satisfaction in perceiving the resemblance between our map, thus marked out, and that which has been given to us with great skill by anticipation. Leaving you to begin the formation of such a map, I proceed to the appearances in the heavens for this month.

The Moon's latitude, on the 1st at midnight, is three degrees thirty-one minutes north, in the twelfth degree of the fifth sign (♌); and it decreases to the 5th, when she passes the ecliptick in her descending node, in the twenty-third degree of the sixth sign (♍), about twenty minutes before one after noon. Her southern latitude increases to the 12th, when it is, at midnight, five degrees thirteen minutes, in the twenty-fifth degree of the ninth sign (♐); and it decreases to the 19th, when she passes the ecliptick in her ascending node about seven in the morning, in the twenty-third degree of the twelfth sign (♓). Her northern latitude now increases to the 25th, when it is at noon five degrees ten minutes, in the twenty-third degree of the third sign (♊); and it decreases to the end of the month, being on the last midnight only forty-seven minutes, in the fourteenth degree of the sixth sign (♍).

The Moon rises, on the 2d in the morning, with the small stars in the head of the Lion to the east of her, and she is afterwards perceived to direct her course to Venus and the first of this constellation. On the 3d, she rises under the stars in the head of the Lion, and is soon followed by the first and Venus, but she does not reach them till after Sun-rise. On the 4th, she rises under Venus and the first of the Lion now to the west of her; and on the 7th is new Moon, at fourteen minutes past seven in the morning, but from her too great southern latitude without an eclipse.

On the 10th, the crescent of the Moon is seen at Sun-set near the horizon; her increasing southern latitude and unfavourable position overcoming the advantage, that would have been otherwise derived by the rapidity of her motion from the Sun. Above her is the second of the Scorpion to the east, and she directs her course to Antares. On the 11th, she is seen near to and to the west of Antares, as she passes this star at three quarters past three this afternoon.

On the 12th, she is seen under the eighth of the Serpent-bearer to the west, directing her course above the third of the Archer; and, being near to her greatest southern latitude, we can but notice the shortness of her duration above the horizon after Sun-set, considering the length of time, that has elapsed since the new Moon. By looking back to former volumes, we may perceive how the track of the Moon has varied; and the teacher of astronomy will do well in shewing his pupil, how much greater would be the duration of Moonlight this evening, if the Moon had as great a northern, as it has a southern latitude. On the 13th, she is seen under (λ) the eleventh of the Archer, directing her course through the back of this constellation.

On the 14th, the Moon is on the meridian at one minute past six, having the small stars in the head of the Archer above her to the west, and the two first of the Goat at a much greater distance above her to the east. On the 15th, she is on the meridian at fifty-eight minutes past six, having almost directly above her the two first of the Goat, and she directs her course to the four small stars in the tail of this constellation.

On the 16th, she is on the meridian at fifty-three minutes past seven, having almost directly under her (ε) the most western of the four small stars in the tail of the Goat, and she sets between (γ) the most western of the two highest, and (κ) the most eastern of the two lowest. She is directing her course to Jupiter. On the 17th, she is on the meridian at forty-six minutes past eight, having Jupiter at some distance above her to the east, and her distance from the four small stars in the tail of the Goat shews that her motion has been rapid since she passed them.

On the 18th, the Moon is on the meridian at thirty-eight minutes past nine, Jupiter being now below her to the west, as she passed him this afternoon, when the planet suffered an occultation. The immersion takes place at fifty-seven minutes and a quarter past four in the afternoon, and the emersion at twenty-seven minutes and three quarters past five. On the 19th, she is on the meridian at twenty-eight minutes past ten, having Saturn to the east of her, and Jupiter at a greater distance below her to the west. She is directing her course above Saturn, whom she will evidently have passed before her next appearance. On the 20th, she is on the meridian at twenty minutes past eleven, having above her to the east the three first stars of the Ram, and near to but below her the sixth of the Fishes to the west. Saturn is now below her to the west, and Jupiter at a much greater distance.

On the 21st is full Moon, at sixteen minutes past four in the afternoon, but from her too great northern latitude without an eclipse. She rises in the evening under the three first stars of the Ram, and her passage under them is the chief feature of her course. On the 22d, she rises under the three first stars of the Ram, now to the west of her, and is soon followed by the Pleiades, to whom she is directing her course. On the 23d, she rises under and very near to the Pleiades, directing her course to (β) the second of the Bull. On the 24th, she is followed soon after her rising by the second of the Bull, but she does not reach this star till after Sun-rise. On the 25th, she rises soon after the second of the Bull, now to the west of her; and from her great northern latitude passes under and near to the tenth of the Waggoner in her course. On the 26th, she rises with the two first stars of the Twins to the east of her, directing her course to (β) the second of them. On the 27th, she rises under the two first of the Twins, and near to the second (β), as she passed near to this star at sixteen minutes past three this afternoon. On the 28th, she is followed soon after her rising by the two small stars and included nebula of the Crab, which she will have passed before midnight, directing her course to the first of the Lion. On the 29th, she rises under the small stars in the head of the Lion; and, during the morning of the 30th, is seen to direct her course to Regulus. On the 31st, she rises in the morning under Regulus to the west of her, as she passed this star at twenty-eight minutes past three in the afternoon of the preceding day.

Mercury is in his superior conjunction on the 1st, and an evening star during this month. His latitude, on the 1st, is one degree and a quarter north, in the eighth degree of the seventh sign (♎); and he passes the ecliptick in his descending node, in the twenty-ninth degree of this sign, on the 13th. His southern latitude increases to one degree fifty-five minutes, in the twenty-sixth degree of the eighth sign (♏), on the 31st. His nearness to the Sun in the former part of the month, and his unfavourable position and southern latitude at the close of it, will preclude the generality of observers from detecting him this month. The Moon passes him on the 7th.

Venus is a morning star, at her greatest elongation on the 9th. Her latitude, on the 1st, is one degree forty-nine minutes south, in the twenty-third degree of the fifth sign (♌); and it decreases to the 20th, when she passes the ecliptick in her ascending node, in the tenth degree of the sixth sign (♍); and her northern latitude increases to a degree, in the twenty-fourth degree of this sign. She is first followed, soon after her rising, by (β) the second of the Virgin, under which star she passes on the 5th; and she continnes her course under the five stars in triangle of this constellation, passing under (η) the seventh on the 12th, and (γ) the third on the 16th. She is directing her course between the tenth and eleventh of the Virgin, passing, from her increasing northern latitude, the first on the 28th, at the distance of about three degrees. The Moon passes her on the 2d.

Mars is an evening star. His latitude, on the 1st, is seven minutes south, in the seventh degree of the eighth sign (♏); and it increases to above twenty minutes, in the twenty-eighth degree of this sign. The unfavourableness of his position allows him so short a duration above the horizon after Sun-set, that he will not be noticed by the generality of observers. The Moon passes him on the 9th.

Ceres is an evening star at first. Her latitude, on the 1st, is seven degrees twenty-one minutes north, in the ninth degree of the seventh sign (♎); and it decreases to seven degrees ten minutes, in the twentieth degree of this sign, on the 25th, her motion being direct through about fourteen degrees. The conjunction takes place on the 2d, when her great northern latitude gives her a duration of near three quarters of an hour after Sun-set; but the influence of the solar rays will overpower her, as they will also in the morning, when from the same cause she rises before the Sun. But the favourableness of her position, as a morning star, will soon enable her to escape from the overpowering rays of the Sun; and about the 17th of the month she will be discovered under the five stars in triangle of the Virgin, about seven degrees from (δ) the fourth of this constellation. She is directing her course to (β) the second of the Balance. The Moon passes her on the 7th.

Jupiter is on the meridian at thirty-eight minutes past ten at night on the 1st, and about nine on the 25th. His latitude, on the 1st, is one degree thirty-two minutes in the sixteenth degree of the twelfth sign (♓); and it decreases about five minutes, his motion being retrograde through about two degrees and a quarter. He will be seen therefore under (φ) the twenty-first of the Water-bearer, moving slowly under it from east to west. The Moon passes him on the 18th.

Saturn is on the meridian at midnight on the 4th, and at eleven at night on the 19th. His latitude, on the 1st, is two degrees forty-four minutes south, in the eleventh degree of the first sign (♈); and it decreases about two minutes, his motion being retrograde through about two degrees and a quarter. At first he is seen, when on the meridian, almost directly under (δ) the fourth of the Fishes, receding slowly to the west. The Moon passes him on the 20th.

Herschel is an evening star. His latitude, on the 1st, is twelve minutes south, in the twenty-sixth degree of the ninth sign (♐), continuing nearly the same during the whole month, his motion being direct through little more than a degree. We shall see him, therefore, near the same spot, about five degrees from (μ) the twelfth of the Archer above him to the east. The Moon passes him on the 13th.

The Sun's apparent diameter, on the 13th, is thirty-two minutes nine seconds; and on the 24th thirty-two minutes and fourteen seconds. The Moon's apparent diameter, on the 4th, is twenty-nine minutes twenty-eight seconds; and it then increases to the 20th, being, at noon, thirty-three minutes fourteen seconds; and it decreases to the end of the month, being, on the last midnight, twenty-nine minutes thirty-two seconds. The Sun enters the eighth sign (♏) on the 23d, at two minutes before noon.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VIII.	7	3	6	38	6	8	5	34
IX.	9	6	8	41	8	11	7	37
X.	11	1	10	36	10	6	9	32
XI.	1	2	0	37	0	7	11	33
XII.	3	8	2	43	2	13	1	39
I.	4	58	4	33	4	3	3	29
II.					6	6	5	32

NOVEMBER, 1820.

IN contemplating the map, which marks out the tract of country, whose inhabitants perceive the solar eclipse to have been annular, my readers will have been struck with the small breadth of the tract, and particularly of that part, which is black, compared with the country in which a partial eclipse, and still more with those extensive regions, in which no eclipse at all is perceived. Hence they will not be at a loss to understand the common expression, that there are more eclipses of the Sun than of the Moon, but fewer of the Sun are seen in a given place. When an eclipse is total, which happens seldom compared with the eclipses that are partial, a similar map may be drawn, and a black line will mark the regions, in which such an eclipse is visible. You will remember, that in a former volume I threw out the hint, that Homer derived his beautiful passage on the distress of Ajax at the sudden darkness that overspread his army, from a total eclipse of the Sun; and that, if on calculating backwards the eclipses of the Sun to a remote period, we should find one, in which the path of the umbra passed over the plains of Troy, about the time of the supposed siege, we should have not only a proof amounting to a very high degree of probability of my assertion, but also we might assign a date to that very important event. Many indeed believe, that the whole is a fiction of the poet. This is not my opinion; for I am inclined to think, that the transaction was real: that Troy was a place of great celebrity: that it was overthrown by a confederacy of the petty barbarous kings of Greece; and that the event gave rise to a specious nobility, of much the same sort as prevailed among the similar clans in the northern part of this island.

But the difficulty of making this calculation is much greater than is apprehended, probably, by most of my readers. For the eclipse, that has lately occurred, where the data were all at hand, there was no small trouble in ascertaining the line of the Moon's shadow; and it may easily be imagined, how much greater the difficulty must be, when the data are to be prepared for a date removed from us by a space of time nearly three thousand years. The total eclipses only are to be considered in this question, and this shortens considerably our operations; but should we find one near the time we think probable for the event we are looking for, still a very small errour in our calculation may make our black line pass at such a distance from the plain of Troy, that it may, and perhaps without cause, be rejected. Mr. Baily has already employed himself on a very important eclipse of the Sun, which took place some hundred years before our æra, and whose Memoir on the subject is in the Philosophical Transactions. If he should extend his researches still farther, we may perhaps find sufficient grounds for supporting or rejecting my conjecture.

But I was led away by this eclipse from some remarks on the comet, which shewed itself for so short a time to us last year. It is time to resume that subject. You will recollect the place, in which it was visible, and thence not be at a loss for its sudden disappearance. It was then going away from the Sun into the remote regions of space, and at a considerable rate. Its path has been examined; but the difficulty of delineating it accurately is very great. Probably accounts will have arrived from other parts of the world, which may ascertain it with no small degree of precision. We have seen, by the path of Ceres, that the zodiacal limits formerly used can no longer be considered as bounds even to our planets. The comets, as they are called, shew to us, that there is no such thing as limits to the range, in which bodies revolving about the Sun are moving. Their orbits may make any assignable angle with the ecliptick; and the space around the Sun may be peopled, if I may use the expression, in a manner of which we cannot possibly form an idea.

These bodies are said to revolve about the Sun at very different periods, and one is confidently talked of as requiring five hundred years to complete a revolution round the Sun. Hence, by following the law laid down by Kepler, an idea is formed of the immensity of our system. For the Earth's distance from the Sun is presumed to be between ninety and a hundred millions of miles; and by following Kepler's law we have only a Rule of Three sum to perform to find the diameter of the orbit of this comet. If the Earth takes a year to perform a revolution of the Sun, having such a diameter for its orbit as we please to assign to it, what must be the diameter of the orbit of a comet to perform its revolution in five hundred years. But this Rule of Three sum requires, that our terms should be made explicit, in this manner: if the square of the periodick time of one body gives such a diameter, then the square of the periodick time of the other body will give the cube of a number, which number is the number of miles in the diameter of the orbit of the last body. We may do the question easily thus:—

$$1^2 : \overline{500}^2 :: 1^3 : 500^{\frac{2}{3}}$$

We are therefore to multiply 500 by 500, which gives us 250,000, and find the cube root of this last number; and this number last found, multiplied into the mean distance of the Earth from the Sun, will give you the mean distance of the comet from the Sun. Now double this last distance, and conceive a sphere made with it as a diameter, and you will have a sphere, in which all the comets are ranging, whose times of revolution are less than five hundred years. Leaving you to contemplate the magnitude of such a sphere, I proceed to describe the appearances in the heavens for this month.

The Moon passes the ecliptick, in her descending node, on the 1st, between five and six in the afternoon, in the twenty-second degree of the sixth sign (♍); and her southern latitude increases to the 8th, when it is, at midnight, five degrees five minutes, in the twenty-second degree of the ninth sign (♐). It then decreases to the 15th, when she passes the ecliptick in her ascending node, in the twenty-first degree of the twelfth sign (♓). Her northern latitude increases to the 21st, when it is, at noon, five degrees one minute, in the eighteenth degree of the third sign (♊); and it then decreases to the 28th, when she passes the ecliptick in her descending node, between eight and nine at night, in the twentieth degree of the sixth sign (♍). Her southern latitude then increases, and on the last midnight is two degrees ten minutes, in the sixteenth degree of the seventh sign (♎).

The Moon rises, in the morning on the 1st, under the body of the Lion, and is soon followed by Venus, to which she is directing her course. On the 2d, she rises under and near to Venus and the second of the Virgin, and is seen afterwards to direct her course to the first. On the 3d, she rises under the five stars in triangle of the Virgin, nearest to the third, but on the opposite side of the ecliptick; and on the 6th is new Moon, at thirty-seven minutes before one in the morning, but from her too great southern latitude without an eclipse.

On the 8th, the crescent of the Moon is seen about Sun-set, in the south-west-by-south; from her unfavourable position and great southern latitude not three quarters of an hour above the horizon after Sun-set, notwithstanding the time that has elapsed since the conjunction; and as on this day she arrives at her greatest southern latitude, this circumstance will be peculiarly pointed out by the teachers of astronomy. On the 9th, she is seen above and near to the third and fourth of the Archer, the former to the west, the latter to the east of her, and she proceeds under the small stars of the head, from her great southern latitude at some distance from them. On the 10th, she has almost directly above her the small stars in the head of the Archer.

On the 11th, the Moon is on the meridian at fifty-four minutes past four in the afternoon, having above her at some distance but to the east of it the two first stars of the Goat, the small stars in the head of the Archer being farther removed from her to the west. On the 12th, she is on the meridian at forty-nine minutes past five, having now above her to the west the two first stars of the Goat, and she is directing her course to the four small stars in the tail to the east of her. On the 13th, she is on the meridian at forty minutes past six, the four small stars in the tail being now perceived to be below her to the west, and directly above her at some distance is the first of the Waterbearer, to the east of which stars are the four small stars in triangle of the Urn: she is directing her course to Jupiter. On the 14th, she is on the meridian at half past seven, having just entered the stream from the Urn, and having above and near to her (λ) the eleventh of the Waterbearer, the small star on the western margin: Jupiter is now near to her to the east, but she does not reach him till a short time after Moon-set. On the 15th, she is on the meridian at nineteen minutes past eight, Jupiter being now at some distance from her to the west, and Saturn at a rather greater distance to the east.

On the 16th, the Moon is on the meridian at seven minutes past nine at night, having now to the west but near to her Saturn, as she passed the planet a little before this appearance. He is now almost directly under her but to the west of the meridian; near to her to the east is (δ) the fourth of the Fishes. On the 17th, she is on the meridian at fifty-eight minutes past nine, having above her and to the east of it the three first stars of the Ram, and she will be perceived in a line with (γ) the third and lowest of these stars and (β) the second of them: Saturn is now at some distance from her to the west. On the 18th, she is on the meridian at fifty-one minutes past ten, having now above her to the west the three first stars of the Ram, and below her, at a greater distance, Menkar with the small stars in the head of the Whale, and she directs her course to the Pleiades. On the 19th, she is on the meridian at forty-eight minutes past eleven, having the Pleiades near to her to the east, and, though eclipsed by her superior brightness to the general observers, her passage through them will be noticed with interest by those in the observatories. Before she sets will be full Moon, as it takes place at fourteen minutes past three in the morning of the 20th, but from her great northern latitude without an eclipse.

The Moon rises, in the evening of the 20th, before Sun-set, under the Pleiades, now to the west of her, and directs her course to (β) the second of the Bull. On the 21st, she rises nearly with and near to (β) the second of the Bull to the east of her, and she passes this star at twelve minutes past six; but they will be both so near to the horizon, that her passage by it will be noticed by those only, who have a good horizon in the north-east, and her great northern latitude so near the summer solstice makes her duration above the horizon longer by about an hour and a half than the longest day in summer. This circumstance will be pointed out by the teachers of astronomy. On the 22d, she is followed soon after her rising by the first of the Twins, and is afterwards perceived to direct her course to the second of this constellation, passing above (ε) the fifth about midnight. On the 23d, she rises with (β) the second of the Twins to the east of her, passing under this star about midnight. On the 24th, she rises under the two first of the Twins to the west of her. On the 25th, she rises soon after the small stars in the head of the Lion to the east of her, passing under (λ) the eleventh before midnight, and she directs her course to Regulus. On the 26th, she is followed soon after her rising by Regulus, as she passes above and near to this star at a quarter past eleven. On the 27th, she rises under the body of the Lion; and during the morning of the 28th is seen to direct her course to (β) the second of the Virgin.

On the 29th, the Moon rises in the morning, and is soon followed by (β) the second of the Virgin, but she does not reach this star till Sunrise. On the 30th, she rises under (η) the seventh of the Virgin, and is afterwards perceived to be directing her course to Spica, and of course under Venus beyond this star to the east.

Mercury is an evening star, at his greatest elongation on the 17th, and stationary on the 26th. His latitude, on the 1st, is two degrees south, in the twenty-seventh degree of the eighth sign (♏); and it increases to the 13th, when it is two degrees thirty-seven minutes, in the thirteenth degree of the ninth sign (♐); and on the 26th, when he is stationary, about a degree and a half, in the twenty-third degree of the same sign, and on the 30th nearly half a degree, in the twenty-second degree of this sign. His unfavourable position and southern latitude keep him so near to the horizon, that he will be detected by few observers. The Moon passes him on the 7th.

Venus is a beautiful morning star during the whole month. Her latitude, on the 1st, is one degree four minutes north, in the twenty-fifth degree of the sixth sign (♍); and it increases to somewhat more than two degrees, in the twenty-eighth degree of the seventh sign (♎), her motion being direct through about thirty-four degrees. She is first seen above and near to (β) the second of the Virgin, passing this star on the 1st, and she directs her course to (η) the seventh of this constellation, passing above and near to it on the 8th, and under (γ) the third on the 13th. Thence she directs her course to (κ) the tenth, passing above Spica on the 26th, at the distance of about four degrees, but she stops short of (κ), by about three degrees. The Moon pasees her on the 1st.

Mars is an evening star. His latitude, on the 1st, is twenty-six minutes south, in the twenty-eighth degree of the eighth sign (♏); and it increases to about forty minutes, in the twentieth degree of the ninth sign (♐), his motion being direct through nearly twenty-two degrees. His unfavourable position places him near the horizon after Sun-set; and that, combined with his nearness to the Sun, will render him little noticeable this month. The Moon passes him on the 7th.

Ceres is a morning star. Her latitude, on the 1st, is seven degrees eight minutes north, in the twenty-third degree of the seventh sign (♎); and seven degrees four minutes, in the third degree of the eighth sign (♏), on the 25th, her motion being direct through nearly thirteen degrees. She is first seen under (ζ) the sixth of the Virgin, being nearly in a line with that star and (ε) the fifth or most northern of the five stars in triangle of this constellation, and she directs her course to (ι) the ninth, a small star about four degrees to the north of (κ), which she passes on the 20th, directing her course under the second of the Balance. The Moon passes her on the 4th.

Jupiter is on the meridian at thirty-four minutes past eight at night, on the 1st, and at seven on the 24th. His latitude, on the 1st, is one degree twenty-seven minutes south, in the fourteenth degree of the twelfth sign (♓), in which he is stationary on the 6th, then moving with a direct motion, his latitude on the last day being above a degree and a quarter, in the fifteenth degree of this sign. He will be seen therefore near the same spot to the west of (φ) the twenty-second of the Water-bearer, moving, after the 6th, slowly towards this star. The Moon passes him on the 15th.

Saturn is on the meridian at ten at night, on the 2d, and at half past eight on the 23d. His latitude, on the 1st, is two degrees forty-two minutes south, in the ninth degree of the first sign (♈); and it decreases about six minutes, his motion being retrograde through about seventy minutes. He is seen therefore near the same spot, having, when on the meridian, (δ) the fourth of the Fishes near him to the east. The Moon passes him on the 7th.

Herschel is an evening star. His latitude is twelve minutes south, in the twenty-seventh degree of the ninth sign, varying little in his progress to his stationary point on the 11th, after which he moves by a direct motion through about a degree. The twelfth of the Archer (μ) is our direction towards him, under which he will be discovered, near the western margin of the Milky-way. The Moon passes him on the 9th.

The Sun's apparent diameter, on the 1st, is thirty-two minutes nineteen seconds, and, on the 19th, thirty-two minutes twenty-seven seconds. The Moon's apparent diameter, on the 1st, is twenty-nine minutes and a half; and it increases to the 17th, being, at noon, thirty-two minutes forty-eight seconds; it then decreases to the 29th, being at noon, twenty-nine minutes thirty-four seconds. The Sun enters the ninth sign (♐) on the 22d, at twenty-two minutes past eight in the morning.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table :—

TABLE OF POSITIONS.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
VIII.	5	6	4	30	4	7		
IX.	7	9	6	42	6	10	5	36
X.	9	4	8	37	8	5	7	31
XI.	11	5	10	38	10	6	9	32
XII.	1	11	0	44	0	12	11	38
I.	3	1	2	34	2	2	1	28
II.	5	4	4	37	4	5	3	31
III.	6	53	6	26	5	54	5	20

DECEMBER, 1820.

YOU have made the calculation I proposed to you last month, and from it we find, that the diameter of the globe, in which the comet moves round the Sun in five hundred years, is about sixty-three diameters of the Earth's orbit; and, consequently, it is evident, that, supposing the diameter of the Earth's orbit to be between one hundred and eighty and two hundred millions of miles (as the modern astronomers assert it to be, but of which I entertain great doubts), the diameter of the globe, in which the bodies hitherto known perform their revolutions around the Sun, is upwards of ten thousand millions of miles. Myriads upon myriads of similar globes, with their respective suns, planets, and comets, are said to exist; and hence astronomy is supposed to afford such enlarged notions of the power of the Creater, that it has become almost a proverbial expression,

"An undevout astronomer is mad."

Is astronomy possessed of such great advantages? Does it really set its disciples so much above the rest of their fellow-creatures? What shall we say then to the phœnomenon, that appeared a few years since, the first astronomer in Europe a confirmed Atheist, making his boast in Atheism as strongly as some of late have done in Deism? How are we to account for a person apparently to us so blind as not to discern the Almighty Maker, in contemplating the innumerable worlds around him? The question perhaps is not of so difficult solution as is imagined. He had been brought up in the Newtonian philosophy; which, though its author from other causes was a firm believer in revealed religion, has a tendency towards Atheism; and when it meets with a mind not previously endued with religious principle, or one nurtured in a superstition, which his riper years and more matured experience incline him to discard, it gradually leads him to Materialism. It is in vain, that Newton tells him, the world is governed by a Spirit, as man by his soul: he finds in the atoms, endued by his master with such extensive imaginary powers, a sufficient cause for the motion of the heavenly bodies, and sets aside the notion of a First Cause, as a superfiaity. Here then is an instance of what the Book of Nature, so vainly extolled above our superior sources of information, may produce in minds of superior texture; and when we think of the millions upon millions of our fellow-creatures, to whom no other book has been opened, how thankful ought we not to be, that to us is displayed the history of man from his origin, interspersed with manifold instances of the Divine goodness, in setting before him the way, which leads to immortality and happiness. I have met, in my walks through life, with poor men, working for their daily bread, who have scarcely had any book to consult but their Bible; yet by assiduous attention to it, and by their minds being unembarrassed with the vain quibbles of disputatious divines, or the farrago of nonsense built upon it by priestcraft, have embraced the sublime doctrines of Christianity in spirit and in truth: and though I trust I set as great a value upon the various sciences, which the best education this country affords led me to pursue, yet I prefer the knowledge of these poor men to all that Greece and Rome have bequeathed to us; and would sooner part with all I know of the laws of nature, than be deprived of the consolation, which I derive from the discourses of my Saviour.

But I should be led too far from my subject, if I followed the train of ideas, which so animating a cause excites. We have discovered, nearly, the extent of the globe, in which our planets and comets revolve about the Sun, the former in orbits making a small angle only with the plane of our orbit, the latter cutting it in every possible direction. The whole mass of matter thus revolving, united with that of the Sun, may be contained in a globe of less than a million of miles in diameter; and we are thus competent to determine the proportion, that this comparatively speaking small globe bears to the large globe, in which the motions of the bodies in our system are performed. This proportion, you know, is easily found by geometry, which teaches us, that all globes are to each other in the proportion of the cubes of their diameters; and hence, as we have estimated the diameter of the globe of our system at upwards of ten thousand millions of miles, we have nothing to do but to make a Rule of Three sum in the following manner: —

The globe of solid matter equal to the Sun, Planets, and Comets, is to the globe of the system, as the cube of one million is to that of ten thousand millions; or as one to the cube of ten thousand, that is, as one is to a million times a million. This latter number appals the imagination. Yet, according to the vain dream of the Newtonians, the space occupied by solid matter is to pure space, or to what may contain a thin æthereal fluid, in this proportion. But what if the law laid down by these Newtonians should not be true! (and there is sufficient ground for doubting it from those bodies, which are more within our grasp) our proportion is at an end. Is it clear, that because bodies, moving in a plane making a small angle only with that of the ecliptick, follow a certain law with respect to their times of revolution, that other bodies, moving in orbits at very different angles, should follow the same law? I cannot give my assent to the proposition, and rather confess my ignorance than make an unqualified assertion. We know, in fact, nothing of the matter. We know nothing of this body, supposed to take five hundred years in its revolution. We know little or nothing of the nature of comets. A future age may explode all our notions; and in the mean time it becomes us not to be too positive in the language we use, respecting the extent of our system.

I have said, that there is sufficient ground for doubting the truth of the famous law, even as it extends to our planets. For when applied to Jupiter and Saturn, a difficulty upon this subject has arisen: but it is supposed to be removed by certain perturbing forces, attributed to these bodies. These perturbing forces have been calculated by an eminent philosopher in France. To be sure, an errour has been discovered in the calculation by an equally distinguished mathematician of our own country. Few, however, are competent to digest the reasonings of either party, immersed as they are in formulæ of a most intricate nature. To me they appear only as *jeux d'esprit* for mathematicians, as a tale of a tub for a whale; for I do not believe, that Jupiter or Saturn have more effect upon each other than a hair on my head has in drawing the Moon out of its course. But leaving you to entertain your own opinions on the fancied attraction of the Newtonians, I proceed to describe the appearances in the heavens during this month.

The Moon's latitude, on the 1st at noon, is two degrees thirty-eight minutes, in the twenty-second degree of the seventh sign (♎); and it increases to the 5th, being, at midnight, nearly five degrees, in the eighteenth degree of the ninth sign (♐). It then decreases to the 12th, when she passes the ecliptick in her ascending node, in the eighteenth degree of the twelfth sign (♓), between one and two in the afternoon. Her northern latitude now increases to the 18th, when it is, at midnight, five degrees, in the nineteenth degree of the third sign (♊); and it decreases to the 25th, when she passes the ecliptick in her descending node, about ten at night, in the seventeenth degree of the sixth sign (♍). Her southern latitude then increases to the end of the month, being, on the last midnight, four degrees fifty-one minutes, in the first degree of the ninth sign (♐).

The Moon rises, in the morning of the 1st, under the five stars in triangle of the Virgin, and is soon followed by the first, which she passes about noon; to the east of her Venus will afterwards be noticed. On the 2d, she rises under Venus, who is at the opposite side of the ecliptick. On the 3d, she rises under the first of the Balance, having just passed this star; and Venus is now above her, with the tenth and eleventh of the Virgin (κ and λ) at some distance to the west. On the 5th is new Moon, at ten minutes past four in the afternoon, but from her great southern latitude without an eclipse.

On the 7th, the crescent of the Moon is seen about Sun-set near the horizon, near south-west-by-south, under the small stars in the head of the Archer. On the 8th, she is under the two first stars of the Goat, from her southern latitude at some distance from them, and she will have passed them before her next appearance. On the 9th, the two first stars of the Goat are seen above her, and now to the west.

On the 10th, the Moon is on the meridian at twenty-nine minutes past four after noon, having the four small stars in the tail of the Goat near to her to the west; Jupiter is at some distance from her to the east, and she is directing her course to him. On the 11th, she is on the meridian at eighteen minutes past five, Jupiter being above her to the east, and it is evident she will have passed him before her next appearance. On the 12th, she is on the meridian at six minutes past six, Jupiter being now below her to the west. She passed him this morning at fifty-minutes past eight. She is directing her course above Saturn to the east of her. On the 13th, she is on the meridian at fifty-three minutes past six, Saturn being below her to the east, but she does not pass him till after Moon-set. On the 14th, she is on the meridian at forty-one minutes past seven, having below and near to her (ε) the fifth to the west, and (ζ) the sixth of the Fishes to the east. Saturn is now removed from and below her to the west. On the 15th, she is on the meridian at thirty-one minutes past eight, being under the three first stars of the Ram, the first being almost directly above her, and the second and third (β and γ) to the west of her.

On the 16th, the Moon is on the meridian at twenty-four minutes past nine at night, having below her the small stars in the tail of the Ram, and above her the Pleiades to the east, to which latter stars she is directing her course. On the 17th, she is on the meridian at twenty-one minutes past ten, having now the Pleiades to the west of her, and Aldebaran with the Hyades below her to the east; she is directing her course to (β) the second of the Bull, or star in the tip of his northern horn. On the 18th, she is on the meridian at twenty minutes past eleven, having above and near to her (β) the second of the Bull, and she passes this star four hours and a quarter afterwards.

On the 19th is full Moon, at five minutes past four in the afternoon, but from her great southern latitude without an eclipse, and she will be seen some time before Sun-set in the north-east. She passes under (κ) the tenth of the Waggoner, directing her course to the second of the Twins. As she passes the summer solstice about eight, and has a considerable northern latitude, her stay above the horizon will exceed our longest day in summer, and hence she is seen for some time before Sun-set on this day, and after Sun-rising on the following day. This will be pointed out to their pupils by the teachers of astronomy. On the 20th, she rises with the two first stars of the Twins to the east of her. On the 21st, she rises under the two first stars of the Twins now to the west of her, being nearest to (β) the second. On the 22d, she rises with the small stars in the head of the Lion to the east of her, and she is seen afterwards to direct her course to (α) the first of this constellation. On the 23d, she rises under the small stars in the head of the Lion, now to the west of her, and before the end of her long course she will pass (α) the first of the Lion, as she reaches this star at thirty-eight minutes past seven of the following morning. On the 24th, she rises under the first of the Lion to the west of her. On the 25th, she rises under the body of the Lion, and is seen afterwards to direct her course under (β) the second of the Virgin to the east of her. On the 26th, she rises under (β) the second of the Virgin; and is seen, during the morning of the 27th, to pass under (η) the seventh, directing her course to (α) the first of this constellation.

On the 28th, the Moon rises in the morning under the five stars in triangle of the Virgin, and nearest to (γ) the third; and she is seen afterwards to direct her course under (α) the first, and she will evidently pass it before her next appearance. On the 29th, she rises under (α) the first of the Virgin, now to the west of her. On the 30th, she rises under (κ and λ) the tenth and eleventh of the Virgin, now to the west of her, and being nearest to (λ). On the 31st, she rises under the two first of the Balance.

Mercury is in his inferior conjunction on the 6th, stationary on the 16th, and at his greatest elongation on the 26th. From the 6th, of course, he is a morning star, and from his proximity to the Sun will not be visible before this day, but his northern latitude will render observations on him easy at the time of his greatest elongation. His latitude, on the 1st, is ten minutes south, in the twenty-first degree of the ninth sign (♐); and he passes the ecliptick in his ascending node on the 2d, in the nineteenth degree of this sign. His northern latitude increases to two degrees fifty-four minutes, in the seventh degree, and it then decreases to one degree thirteen minutes in the nineteenth degree of this sign, his motion being direct from the stationary point through about twelve degrees. On the day of greatest elongation he is about twelve degrees above the horizon at Sun-rise, being nearly in a line with Antares and (η) the seventh of the Serpent-bearer. The Moon passes him on the 5th.

Venus is a morning star. Her latitude, on the 1st, is two degrees eight minutes north, in the twenty-ninth degree of the seventh sign (♎); and it decreases to about a degree and a quarter, in the fourth degree of the eighth sign (♏). She rises at first about five hours before the Sun, and will therefore be a splendid object in the morning in the eastern hemisphere. She is first seen to the west of the tenth and eleventh of the Virgin (κ and λ), directing her course between these two stars, passing under (κ) on the 4th, and above (λ) on the 5th. She thence directs her course between the two first stars of the Balance, passing above and near to (α) the first on the 12th, and she thence directs her course to (β) the second of the Scorpion, passing above and near to this star on the 28th. The Moon passes her on the 2d.

Mars is an evening star, so near to the Sun, and in such an unfavourable position, that he will not have many observers. His latitude, on the 1st, is forty-two minutes south, in the twentieth degree of the ninth sign (♐); and it increases to about fifty-six minutes, in the fourteenth of the tenth sign (♑). It is unfortunate that his passage by Herschel should be in so unfavourable a position, as he passes this planet on the 12th, at fifty-three minutes past ten at night, being at the distance of only thirty-five minutes and three quarters from it to the south. The Moon passes Mars on the 6th.

Ceres is a morning star. Her latitude, on the 1st, is seven degrees three minutes north, in the sixth degree of the eighth sign; and it decreases to seven degrees, and afterwards increases about two minutes, in the eighteenth degree of this sign, her motion being direct through nearly twelve degrees and a half. She is first seen under and near to but to the west of (μ) the twelfth of the Virgin, a small star in her northern foot, which she passes on the 7th, directing her course under (β) the second of the Balance, passing in her way under and near to (δ) the fourth of this constellation on the 16th, and under (β) on the 28th, and she finishes her course under and near to (ξ) the sixteenth, but to the west of it. The Moon passes her on the 2d, and on the 31st.

Jupiter is on the meridian at half past six in the evening on the 2d, and at five on the 24th. His latitude, on the 1st, is one degree twenty minutes south, in the fifteenth degree of the twelfth sign (♓); and it decreases to about a degree and a quarter, his motion being direct through about four degrees. He is first seen therefore under and near to but to the west of (φ) the twenty-second of the Water-bearer, passing this star on the 4th, and receding from it in the barren space under the four stars in square. The Moon passes him on the 12th.

Saturn is on the meridian a little before eight at night on the 1st, and at a quarter past six on the 25th. His latitude, on the 1st, is two degrees thirty-six minutes south, in the seventh degree of the first sign (♈); and it decreases about seven minutes. He is stationary on the 10th, and will therefore be seen near the same barren spot, under (δ) the fourth of the Fishes, to the east of him, and the two eastern of the four stars in square, to the west of and at a considerable distance from him. The Moon passes him on the 13th.

Herschel is in conjunction with the Sun on the 21st, and afterwards a morning star, too near the Sun to be discovered during this month by the general observer. His latitude, on the 1st, is twelve minutes south, in the twenty-eighth degree of the ninth sign; and it remains nearly the same during the month, his motion being direct through about two degrees and a quarter. The Moon passes him on the 6th.

The Sun's apparent diameter, on the 1st, is thirty-two minutes thirty-one seconds, and on the 13th, thirty-two minutes thirty-four seconds. The Moon's apparent diameter, on the 2d at noon, is half a degree; and it increases to the 13th, on which day it is about thirty-two minutes twenty seconds. It then decreases to the 26th, on which day it is about twenty-nine minutes thirty-six seconds; and it then decreases to the end of the month, being, on the last midnight, half a degree and forty seconds. The Sun enters the tenth sign (♑) on the 21st, at fifty minutes past eight in the morning.

For the position of the fixed stars at any hour of the night, consult the volume for 1806, according to the following Table:—

TABLE OF POSITIONS.

Pos.	1		8		17		25	
	h.	m.	h.	m.	h.	m.	h.	m.
IX.	5	6	4	36	3	56	3	20
X.	7	1	6	31	5	51	5	15
XI.	9	2	8	32	7	52	7	16
XII.	11	8	10	38	9	58	9	22
I.	0	58	0	28	11	48	11	12
II.	3	1	2	31	1	51	1	15
III.	4	50	4	20	3	40	3	4
IV.	7	11	6	41	6	1	5	25
V.			8	32	7	52	7	16

ANOTHER year is thus brought to its termination, and I am concluding my report at a time, when the minds of men are in no small degree of agitation. The two most important subjects, on which their thoughts can be engaged, Religion and Politicks, are under discussion; and the spirit of freedom and enquiry has extended itself to large classes, which have been accustomed to be considered as of little account in the world. "What have the people to do with the laws but obey them," was the wanton expression of a Prelate, endued with considerable talents: but the people think otherwise, and from various causes have been enabled to exercise their faculties in a manner unknown to former ages. What with Sunday Schools, Bell Schools, Lancaster Schools, Bible Societies, Missionary Societies, the reading publick has been multiplied a hundred-fold what it was a hundred years ago. Our civil institutions have in consequence been brought under a closer examination; and from studying the encomiums on the excellencies of a representative government, the eyes of the people have been fixed on another question, whether in reality they possess the share in the representation, to which they think themselves justly entitled. By the singular boldness of an individual, who is now suffering as a martyr to Deism, the objections of unbelievers to our Holy Religion have been so diffused throughout the kingdom, that there is scarcely nook or corner, into which they have not penetrated; and the "gold, silver, precious stones, wood, hay, stubble," which have been raised by man upon the foundation of our faith, are brought to the fiery trial. What all this will produce, no one can foresee; it is a great conflict. According to a prophecy of very ancient date: "Many shall be purified, and made white, and tried: but the wicked shall do wickedly: and none of the wicked shall understand, but the wise shall understand." Indiscriminate censure prevails too much in the opposing parties; but who shall bring them to a reconciliation on their mutual interests? The child, that has arrived to years of discretion, will not be treated by a wise parent as he was during his minority.

Interdum vulgus recte videt, est ubi peccat.

THE END.

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